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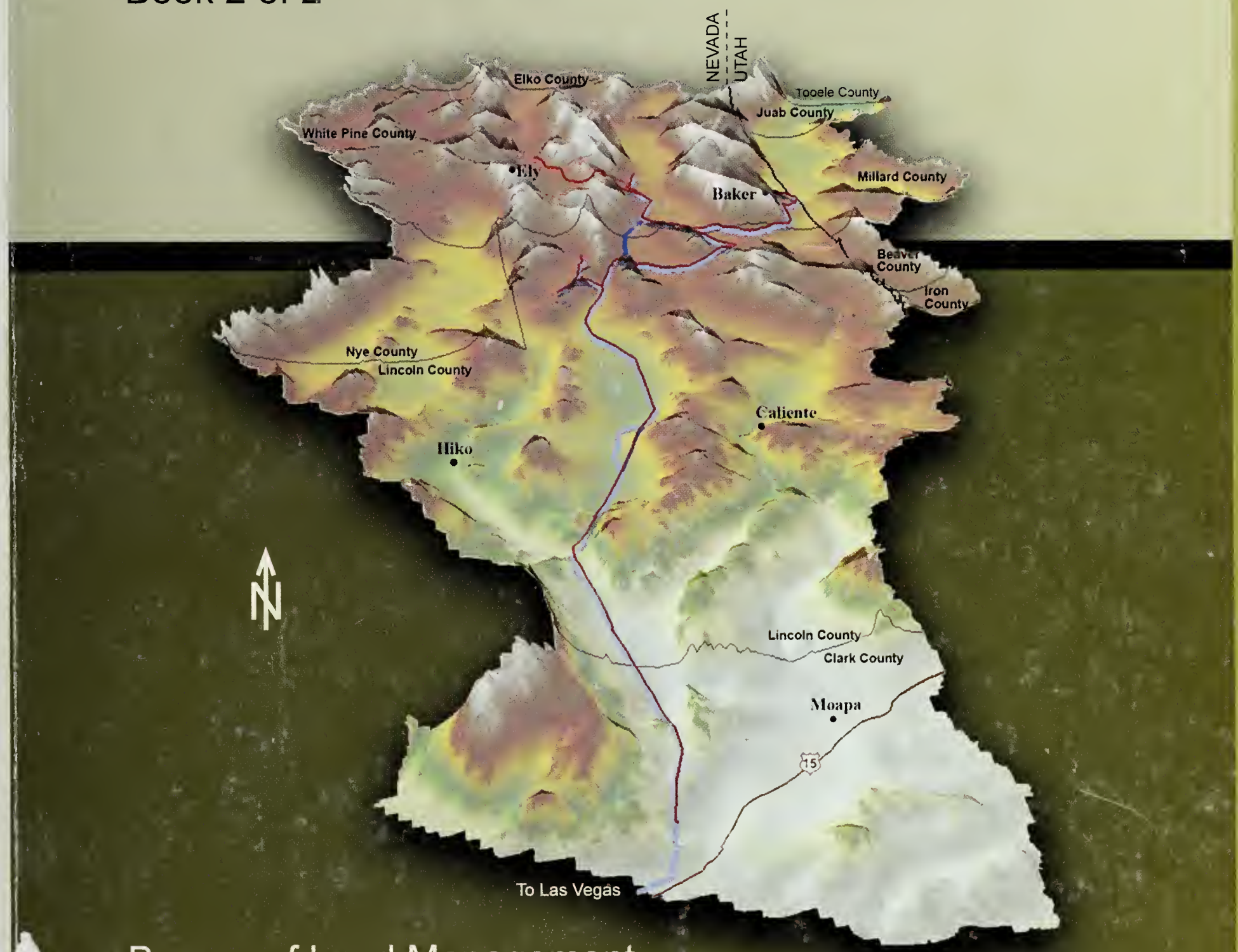

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August 2012
FES 12-33

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Clark, Lincoln, and White Pine Counties Groundwater Development Project Final Environmental Impact Statement

Book 2

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August 2012

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Due to the size of this analysis, the EIS was broken into 2 books. This is the second book and contains a portion of Chapter 3 (starting with Section 3.6 -- Terrestrial Wildlife), plus Chapters 4 through 6, references, glossary, and index.

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3.6 Terrestrial Wildlife

3.6.1 Affected Environment

3.6.1.1 Overview

This section covers general wildlife, species of management concern, and special status terrestrial wildlife species. General wildlife habitats within the study area are described and quantified in Section 3.5, Vegetation Resources, while general wildlife species are discussed briefly in this overview section.

The region of study for terrestrial wildlife includes 33 hydrologic basins that encompass portions of Nevada and Utah. The natural resources region of study differs slightly from the water resources model area as shown in **Figure 3.6-1**. This is explained in more detail in Section 3.5, Vegetation Resources.

Detailed discussion of management concern and special status species is included for specific portions of the study area, in relation to the ROW and groundwater development areas. The discussion of management concern species focuses on big game, small mammals, game birds, waterfowl, shorebirds, raptors, and migratory birds. These species include wildlife species that occur in the general habitat types found in the project area.

The special status species discussion includes mammals, birds, reptiles, and terrestrial invertebrates that are listed or proposed for listing under the ESA, and considered sensitive by the BLM or the USFS (for that portion of USFS land crossed by a ROW option). The BLM special status species are: 1) species listed or proposed for listing under the ESA, and 2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, which are designated as BLM sensitive by the State Director(s).

All federal candidate species, proposed species and delisted species in the 5 years following delisting will be conserved as BLM-sensitive species (per the BLM Manual 6840 [BLM 2008a]). The Final EIS considers the 2011 updated BLM sensitive species list.

USFS examines the following sources as possible candidates for listing as sensitive species: 1) USFWS candidates for federal listing under the ESA (categories 1 and 2); 2) state lists of endangered, threatened, rare, endemic, unique, or vanishing species, especially those listed as threatened under State law; and 3) other sources as appropriate in order to focus conservation management strategies and to avert the need for federal or state listing as a result of National Forest management activities (USFS 1991).

QUICK REFERENCE

ACEC – Area of Critical Environmental Concern

ACM – Applicant Committed Protection Measure

APLIC – Avian Power Line Interaction Committee

BGEPA – Bald and Golden Eagle Protection Act

DOI – U.S. Department of Interior

ESA – Endangered Species Act

ET – Evapotranspiration

GBBO – Great Basin Bird Observatory

GBNP – Great Basin National Park

MBTA – Migratory Bird Treaty Act

NDOW – Nevada Department of Wildlife

NEPA – National Environmental Policy Act

NNHP – Nevada Natural Heritage Program

NPS – National Park Service

NWR – National Wildlife Refuge

PGH– Preliminary General Habitat

PPH – Preliminary Priority Habitat

RMP – Resource Management Plan

UDWR – Utah Division of Wildlife Resources

USFS – United States Forest Service

USFWS – U.S. Fish and Wildlife Service

Species habitats are managed by the agency who owns or administers the land (i.e., BLM, NPS, USFS, and USFWS refuges). The species are managed by the state agencies (NDOW and the UDWR) with coordination and cooperation with the federal agencies. One exception to species management is the NPS authority in park such as GBNP. NPS direction is to protect and manage resources in the park including terrestrial wildlife resources.

On lands with federally listed species, such species are under the jurisdiction of the USFWS. The USFWS coordinates with the state agencies to develop and implement recovery and other plans for threatened and endangered species.

Collectively, the state and federal agencies develop and implement management plans and strategies for both game and nongame terrestrial wildlife species. Management direction and guidance are provided through the implementation of management plans, agreements, and their wildlife plans (e.g., Wildlife Action Plan [2006] and the Utah Comprehensive Wildlife Conservation Strategy [Sutter et al. 2005].

As previously mentioned in Section 3.5, Vegetation Resources, the Natural Resources Group provided input and evaluation on species occurrences in a baseline summary report (ENSR/AECOM 2008). The Natural Resources Group included representatives from the BLM in Nevada and Utah, USFWS in Nevada and Utah, NDOW, UDWR, SNWA, AECOM (formerly ENSR) (BLM's EIS Contractor), and ENTRIX (subcontractor to AECOM). Tables from that baseline report are the source of **Table F3.6-1** in **Appendix F3.6**. Other data sources used by the Natural Resources Group and for this section include Natural Heritage data, primary research, conservation reports, and input from agency staff. The Natural Heritage dataset was acquired from Nevada and Utah, and occurrence data were used to identify rare and sensitive species presence. Many studies on various animal groups, including mammals (SNWA 2007a, 2008), birds (Great Basin Bird Observatory [GBBO] 2007a,b), herpetofauna (SNWA 2008), and terrestrial invertebrates (Ecological Sciences, Inc. 2007) have been conducted in the region. Amphibians are addressed in Section 3.7, Aquatic Biology Resources. Wildlife Action Plans for Utah (Sutter et al. 2005) and Nevada (Wildlife Action Plan Team 2006) provided additional information on species. The draft Revised Nevada Wildlife Action Plan was referenced for habitat information for new BLM Sensitive Species List additions. The USFWS lists of threatened, endangered, proposed and candidate species, USFS Sensitive Species list, GBNP Listing of Sensitive and Extirpated Species, and BLM's Sensitive Species list were referenced to identify protected and management species.

Wildlife species that have been identified by tribes (Duckwater, Goshute, and Ely Shoshone) as culturally significant include elk, bighorn sheep, antelope, deer, bears, mountain lions, coyotes, wolves, rabbits (pygmy, jack, cottontail), rock chucks, ground squirrels, pack rats, pocket gophers, sage-grouse, mudhen, crickets, and various species of raptors and waterfowl. They have cultural significance in many forms, including food resources, spiritual resources, and resources as traditional values (BLM 2012a; James 1981; Steele 2010). These animals have the potential to occur throughout historical aboriginal territories and throughout the proposed project area in appropriate habitat.

General wildlife communities in the natural resources region of study occur in two main ecological regions: the Great Basin Desert and Mojave Desert. These communities include mammals, birds, herpetofauna, and terrestrial invertebrates. Large mammals occurring in these areas include Rocky Mountain elk, mule deer, pronghorn antelope, desert and Rocky Mountain bighorn sheep, and mountain lions. Medium-sized mammals include coyote, kit fox, and American badger. Small mammals are abundant and include a variety of bat species and rodents. General terrestrial habitat types in these two ecological regions include: shrubland, desert scrub, pinyon-juniper woodland, grassland, playa, and riparian.

Based on surveys conducted by the SNWA (2007a, 2008), 20 small mammal species were collected in seven of the basins that the ROWs and groundwater development areas would cross (Cave, Delamar, Dry Lake, Hamlin, Lake, Snake, and Spring). Fourteen species were associated with riparian and phreatophytic plant communities (i.e., greasewood flats). Species that dominated the collections in one or more valleys included the following: Least chipmunk, Great Basin pocket mouse, Ord's kangaroo rat, Chisel-toothed kangaroo rat, Merriam's kangaroo rat, and Deer mouse.

Some other small mammal species that occur in the study area include: northern grasshopper mouse, pinyon mouse, dark kangaroo mouse (NDOW 2010a), western harvest mouse, montane vole, desert woodrat, and white tailed antelope squirrel.

From April 2005 through June 2006, acoustic surveys were conducted at 32 sites to identify bat species presence within 12 valleys crossed by the GWD Project. Surveys identified a total of 16 special status species (O'Farrell Biological Consulting 2006). From July 9, 2008 through October 9, 2008, mist net surveys were conducted at 11 select spring sites, 7 of which were generally associated with locations sampled in the previous acoustic surveys. Nine bat special status species were captured (SNWA 2009a). Special status bat species are listed in **Appendix F**, **Table F3.6-1**. Of the 22 species listed in the table, only 5 (Allen's big-eared bat, California leaf-nosed, cave myotis, greater western mastiff bat, and spotted bat) were not detected during acoustic or mist net surveys.

Many bird species can be found within the study area throughout the year; some are year-round residents, whereas others are present only during the breeding season or in winter (GBBO 2007a,b). These bird species include neotropical migrants, upland game birds, raptors, waterfowl, and shore birds. Common species include the following: horned lark, house finch, black-throated sparrow, rock wren, northern mockingbird, gambel's quail, greater sage-grouse, red-tailed hawk, northern harrier, american kestrel, and common aquatic bird species, including: Canada goose, cinnamon teal, gadwall, redhead, American coot, pied-billed grebe, double crested cormorant, great blue heron, and killdeer.

There are also a number of important bird areas that have been identified by the Audubon Society in both Nevada and Utah. Important bird areas are sites that provide essential habitat for one or more species of bird. They can include public or private lands, or both, and they may or may not be legally protected. Important bird areas are discussed in more detail later in this section as the locations of individual important bird areas relate to ROWs, groundwater development areas and the region of study.

From July through October 2007, reptile and amphibian surveys were conducted by the SNWA within six valleys crossed by the GWD Project (Cave, Dry Lake, Hamlin, Lake, Snake, and Spring valleys). Fourteen herptile species, out of 26 potentially present species, were identified during these surveys. An additional 2 species were observed during a 2005 survey, for a total of 16 species. The number of species reported per basin ranged from 7 in Hamlin Valley to 12 in Spring Valley. Side-blotched lizard, long-nosed leopard lizard, sagebrush lizard, striped whipsnake, Great Basin gopher snake, and Great Basin spadefoot toad were detected in five or six of the surveyed basins. Other reptiles that occur in the natural resources region of study include species such as the Sonoran Mountain kingsnake, short-horned lizard, desert horned lizard, Great Basin collared lizard (ENSR/AECOM 2008), glossy snake, western red-tailed skink, western blind snake, terrestrial garter snake, coachwhip snake, long-nosed snake, racer snake, and western whiptail lizard (SNWA 2008). Herptile species identified by the Natural Resources Group and newly added species from the Nevada updated BLM sensitive species list are listed in **Appendix F**, **Table F3.6-1**.

A terrestrial invertebrate species desktop review and field survey was completed in 2006 by Ecological Sciences, Inc. (Ecological Sciences, Inc. 2007). Ecological Sciences, Inc. collected invertebrates from 76 sites in the Great Basin and Mojave Desert regions and identified a total of 681 terrestrial invertebrate species, after completing taxonomic analysis of one-third of the specimens. The identified species represented 149 families from 21 invertebrate orders, many of which have aquatic larval stages and terrestrial adults. The orders with the greatest number of species were wasps, beetles, moths, and flies.

The following plans identify wildlife species that the BLM or the states of Nevada or Utah consider a focus of management:

- Ely District Record of Decision and Approved Resource Management Plan (BLM 2008b);
- Record of Decision for the Approved Las Vegas Resource Management Plan and Final Environmental Impact Statement (BLM 1998);
- Nevada Wildlife Action Plan (Wildlife Action Plan Team 2006), and Nevada Wildlife Action Plan (Wildlife Action Plan Team 2012); Utah Comprehensive Wildlife Conservation Strategy (Sutter et al. 2005).

3.6.1.2 Right-of-way Areas

Species of Management Concern

The BLM and other land-management agencies manage wildlife habitat on public lands; the NDOW and the UDWR manage wildlife populations on the public lands. The NPS manages both wildlife and habitat within units it administers. For the purposes of this document, terrestrial wildlife species of management concern are defined as

species considered to be a focus of management by the BLM or the states of Nevada and/or Utah and include big game mammals, small mammals, upland game birds, aquatic birds, raptors, passerines, other migratory birds (e.g., hummingbirds, sparrows, and corvids), and reptiles. They are identified in one or a combination of the plans listed above. Non-game species that are included in these plans are a focus of management concern because populations are declining, threats to the species need to be monitored, or the species are protected under regulations such as the MBTA.

Working under BLM direction, the Natural Resources Group developed the list of species presented in **Appendix F, Table F3.6-1.** This table provides the representative list of wildlife species of management concern that occur within the natural resources region of study and identifies the hydrologic basins in which the species can be found in ROW areas, according to the Nevada and Utah Natural Heritage datasets, data from the state agencies, and project-specific survey data. The list of bird species in the table – addressed in more detail in this document – follows the policy and management guidance set out in the BLM and USFWS MOU signed in April 2010 as well as the 2001 EO 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds. Both documents direct the agencies to promote the conservation of migratory birds and conduct project evaluations to focus on species of concern, priority habitats, and key risk factors.

Habitat requirements and life-history information for species of management concern are provided in **Appendix F, Table F3.6-2**. The following information summarizes the occurrence of representative wildlife species of management concern within the ROW areas. There are no ROW areas in the State of Utah.

Five big-game mammals of management concern are known to occur within the ROW areas (**Appendix F, Table F3.6-1**). The occurrence and habitat of these big game species are as follows:

- **Pronghorn antelope (Figure 3.6-1)** – The overall range for this species overlaps with the central and northern portions of the ROWs. No crucial winter range is present in the ROWs. Pronghorn prefer gently rolling or flat topography that provides good visibility. Primary habitat for this species consists of mixed shrubs, grasses, and forbs with modest height and low density of pinyon and juniper trees. Sagebrush is used as cover and food sources.
- **Rocky Mountain elk (Figure 3.6-2)** – The overall range for elk overlaps with the ROWs in Dry Lake, Cave, Lake, Steptoe, and Spring valleys. The ROWs do not overlap crucial summer habitat. This species occurs in a wide variety of habitats, ranging from low to upper elevations. Summer habitat includes mixed conifer and aspen forests and higher-elevation, pinyon-juniper woodlands and meadows as well as mountain brush and grass communities. Winter use mainly occurs in pinyon-juniper woodlands and sagebrush grasslands between approximately 5,000 and 9,500 feet elevation.
- **Mule deer (Figure 3.6-3)** – Mule deer range occurs along the central and northern portions of the ROWs. Crucial summer and winter ranges overlap the ROWs in Cave, Dry Lake, Hamlin, Lake, Spring, Steptoe, and Snake valleys. This species is widespread, with distribution primarily associated with middle and upper elevations in sagebrush and grassland habitats that occur throughout much of the ROWs as well as all forest types. Forbs and grasses comprise most of the diet in the spring and summer; shrubs are used in the winter and dry summer periods. During the summer, mule deer tend to rely on riparian, mixed mountain brush and forest communities. Movement corridors between Dry Lake Valley up into Lake and Cave valleys are crossed by the ROW.
- **Desert bighorn sheep (Figure 3.6-4)** – Occupied habitat for desert bighorn sheep overlaps with the ROWs in Pahranagat and Delamar valleys and is adjacent to the ROWs in Cave, Dry Lake, Coyote Spring, Garnet, Hidden Valley, and Las Vegas valleys. Potential desert bighorn habitat overlaps with the ROW in Spring and Steptoe valleys and is adjacent to the ROWs in Cave and Dry Lake valleys. All occupied desert bighorn sheep habitat is managed as priority habitat by the BLM on BLM managed lands (BLM 2008b). Migration corridors for desert bighorn sheep cross the ROWs in Las Vegas, Garnet, Hidden, and Coyote Spring valleys. Desert bighorn sheep movements and migration corridors are dynamic and occur in the ROW areas in Delamar and Coyote Spring valleys. Movement between Las Vegas Range and Arrow Canyon Range and Delamar Mountains and Sheep Range (NDOW 1978) are crossed by the ROW. More recent data indicate that the desert bighorn sheep distribution includes the Hiko and South and North Pahroc Ranges to the west of Dry Lake Valley, and Egan Range and Schell Creek Range. Potential habitat is currently being targeted by the NDOW for reintroduction of desert bighorn sheep to expand the occupied areas throughout the state. Desert bighorn sheep habitat typically consists of rough, rocky, and steep terrain, broken by canyons and washes. Bighorn sheep require access to water

during the summer and throughout the year during drought conditions. Their diet mainly consists of grasses, shrubs, and forbs. This species also is a BLM sensitive species, but for the purposes of this document it is addressed with the species of management concern in order to address all big game species together.

- **Rocky Mountain bighorn sheep (Figure 3.6-5)** – The ROWs are located adjacent to occupied habitat in Snake and Hamlin Valleys and adjacent to potential habitat in Spring Valley; however, the ROWs do not cross occupied or potential habitat. Rocky Mountain bighorn sheep prefer high, steep, rocky slopes that are close to suitable feeding sites. However, during the winter months, they will seek open areas in lower elevations where snow depth is lighter and food sources are more plentiful (UDWR 2008). Primary forage consists of grasses, forbs, and shrubs.

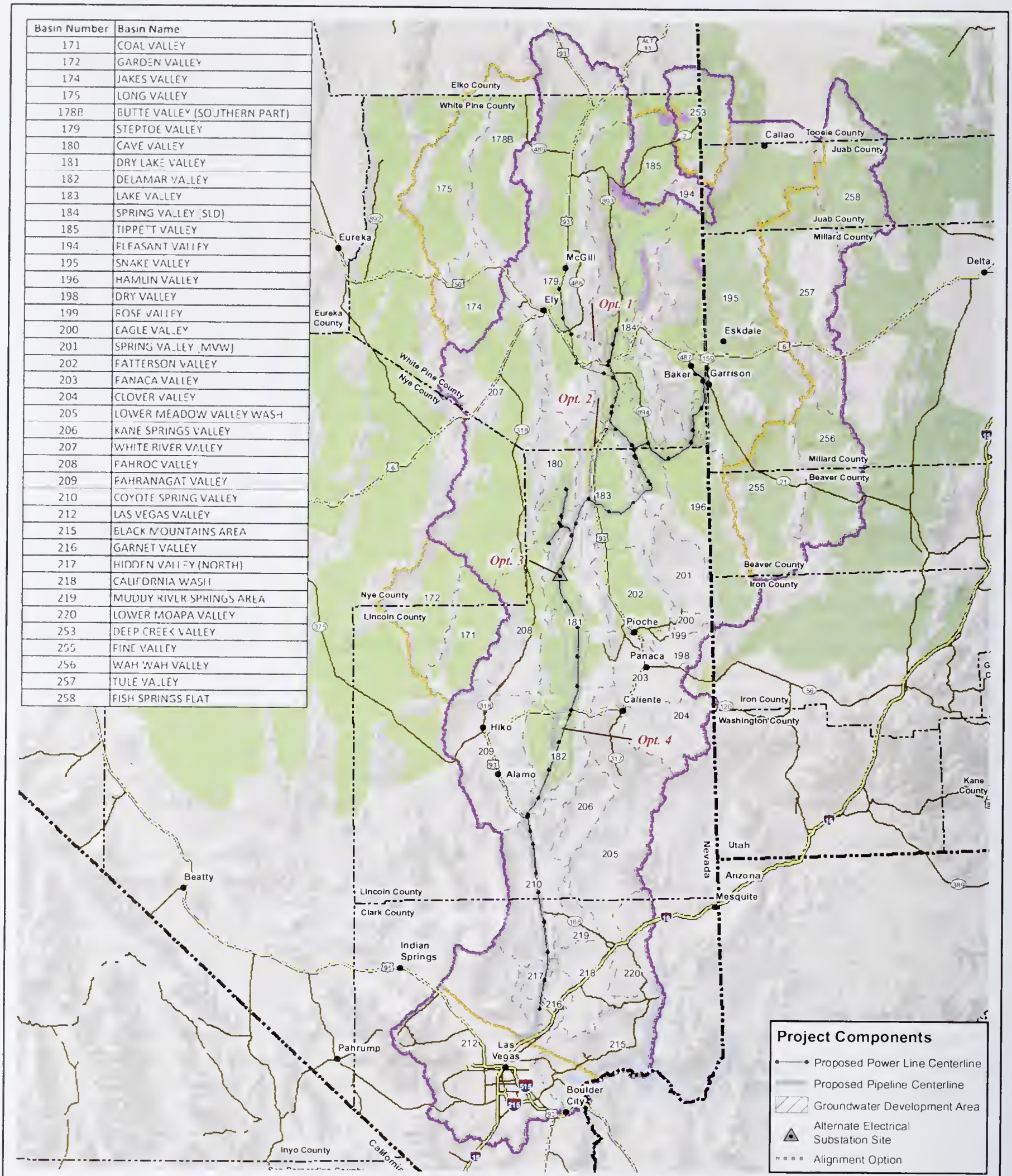
As reference for big game including antelope, elk, and mule deer, crucial winter range is used between November 1 through March 31, and crucial summer range is used between April 15 and late September (BLM 2008b). Within occupied desert bighorn habitat, the rut occurs from approximately August through September (NDOW 1978). Lambing can occur at any time of the year and is associated with favorable environmental conditions. However, lambs are normally dropped during late February or early March in Southern Nevada and during April or early May in Central Nevada (NDOW 1978). The BLM recommends a restriction on activity within bighorn sheep occupied habitat between March 1 to May 31 and July 1 through August 31 (BLM 2008b). Range information shown on **Figures 3.6-1** through **3.6-5** display NDOW (2004) data for antelope, elk and deer and NDOW (2010b) data for bighorn sheep.

Of the representative species listed in **Appendix F**, **Table F3.6-1**, 35 small mammal species are known to occur or suspected to occur within basins crossed by the ROWs; 9 are species of management concern (brush mouse, desert kangaroo rat, desert pocket mouse, Inyo shrew, kit fox, Merriam's shrew, ringtail, vagrant shrew, and water shrew) and the remaining species are BLM sensitive. The BLM sensitive species are addressed in the Special Status Species section. When considering species range or habitat use, water shrew and Inyo shrew are unlikely to occur in the ROWs. Kit fox habitat occurs in all basins crossed by the ROWs (USGS 2007).

Of the five representative management concern raptor species, two were observed during winter raptor surveys (SNWA 2005-2008). Northern harrier was observed in the ROW in Cave and Delamar valleys and within 0.5 mile of the ROW in two additional valleys (Dry Lake and Spring). Klinger and Williams (2005) also reported an incidental siting of northern harrier within the project area. Prairie falcon was recorded in the ROW in Delamar Valley and also within Dry Lake and Spring valleys within the 0.5 mile buffer (GBBO 2007b, SNWA 2005-2008). The NDOW raptor nest database has no nest records for prairie falcon within the ROW or the 0.5-mile buffer. Within the 10-mile buffer, there are 14 nests in 5 valleys crossed by the ROW (Garnet, Las Vegas, Snake, Spring, and Steptoe); all but two were recorded between 1973 and 1981, with two nests in Las Vegas Valley recorded in 1997 and 2001. Flammulated owl is also suspected to occur in a number of the basins that would be crossed by the ROWs. Many other raptor species are likely to occur in habitats crossed by the ROWs; specific information on special status raptor species is addressed in the next section.

Upland game-bird species (including migratory species) within the ROWs include: greater sage-grouse, mourning dove, chukar, quail, and band-tailed pigeon. Greater sage-grouse, which is considered a BLM sensitive species, was petitioned for listing under the ESA. The species listing was found to be warranted but precluded, and the species has been designated a federal Candidate (Priority 8) species (Federal Register, March 5, 2010).This species is discussed in the Special Status Species section. Mourning dove has been documented in four of the valleys that would be crossed by the ROWs (Coyote Spring, Cave, Snake, and Spring valleys) and is likely to occur in all the valleys crossed by the ROWs. Band-tailed pigeon was recorded in Las Vegas Valley (GBBO 2007a) and could occur within the ROW in this area.

Basin Number	Basin Name
171	COAL VALLEY
172	GARDEN VALLEY
174	JAKES VALLEY
175	LONG VALLEY
178B	BUTTE VALLEY (SOUTHERN PART)
179	STEPTOE VALLEY
180	CAVE VALLEY
181	DRY LAKE VALLEY
182	DELAMAR VALLEY
183	LAKE VALLEY
184	SPRING VALLEY (SLD)
185	TIPPETT VALLEY
194	PLEASANT VALLEY
195	SNAKE VALLEY
196	HAMLIN VALLEY
198	DRY VALLEY
199	ROSE VALLEY
200	EAGLE VALLEY
201	SPRING VALLEY (MVW)
202	PATTERSON VALLEY
203	PANACA VALLEY
204	CLOVER VALLEY
205	LOWER MEADOW VALLEY WASH
206	KANE SPRINGS VALLEY
207	WHITE RIVER VALLEY
208	PAHROC VALLEY
209	PAHRANAGAT VALLEY
210	COYOTE SPRING VALLEY
212	LAS VEGAS VALLEY
215	BLACK MOUNTAINS AREA
216	GARNET VALLEY
217	HIDDEN VALLEY (NORTH)
218	CALIFORNIA WASH
219	MUDDY RIVER SPRINGS AREA
220	LOWER MOAPA VALLEY
253	DEEP CREEK VALLEY
255	FINE VALLEY
256	WAH WAH VALLEY
257	TULE VALLEY
258	FISH SPRINGS FLAT



Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.6-1

Pronghorn Habitat

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual use or aggregate use with other data

Basin Number	Basin Name
171	COAL VALLEY
172	GARDEN VALLEY
174	JAKES VALLEY
175	LONG VALLEY
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179	STEPTOE VALLEY
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194	PLEASANT VALLEY
195	SNAKE VALLEY
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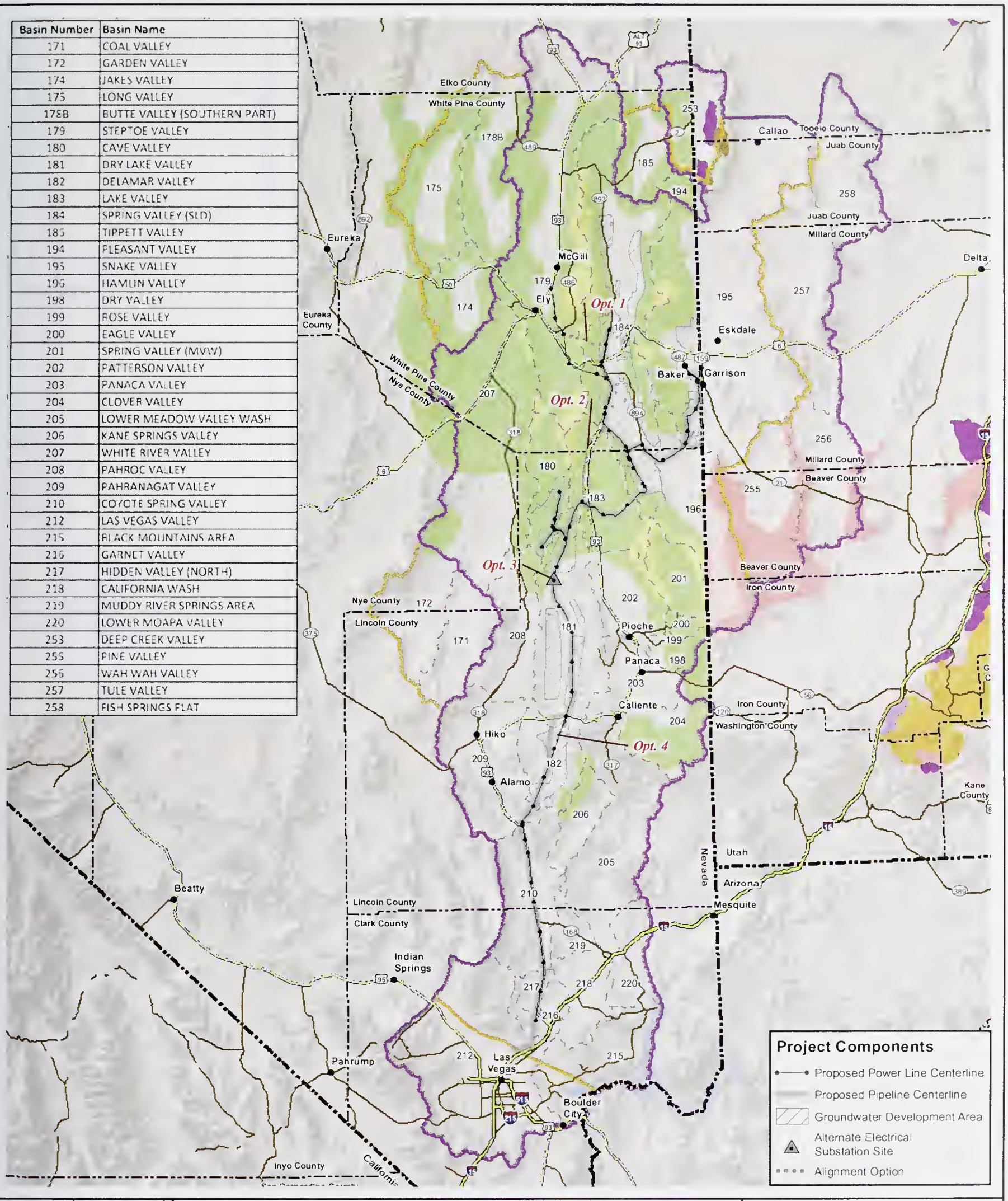
220	LOWER MOAPA VALLEY
253	DEEP CREEK VALLEY
255	PINE VALLEY
256	WAH WAH VALLEY
257	TULE VALLEY
258	FISH SPRINGS FLAT



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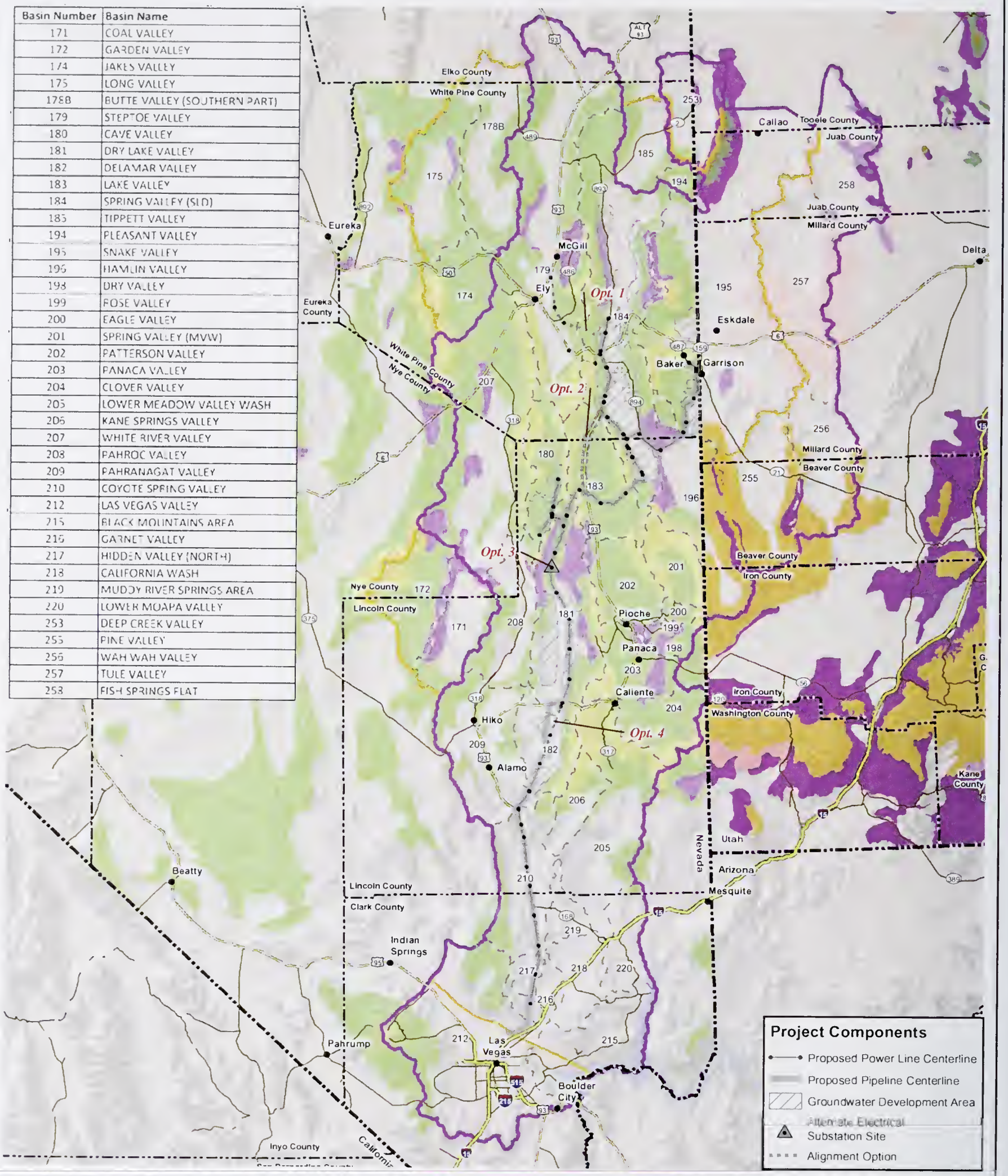
257	TULE VALLEY
258	FISH SPRINGS FLAT



Natural Resources
Region of Study
Water Resources Region of Study
Interstate Highway
US Highway
Major Road
State Boundary
County Boundary
Hydrographic Basins

Mule Deer Habitat

Nevada
- Crucial Summer
- Crucial Winter
- Year-round

Utah
- spring/fall crucial
- spring/fall substantial
- summer crucial
- summer substantial
- summer/fall crucial
- summer/fall substantial
- winter crucial
- winter substantial
- winter/spring crucial
- winter/spring substantial
- year-long crucial
- year-long substantial

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.6-3

Mule Deer Habitat

0 10 20 40 60 Miles
0 15 30 60 Kilometers
1 inch equals 40 miles
N

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171	COAL VALLEY
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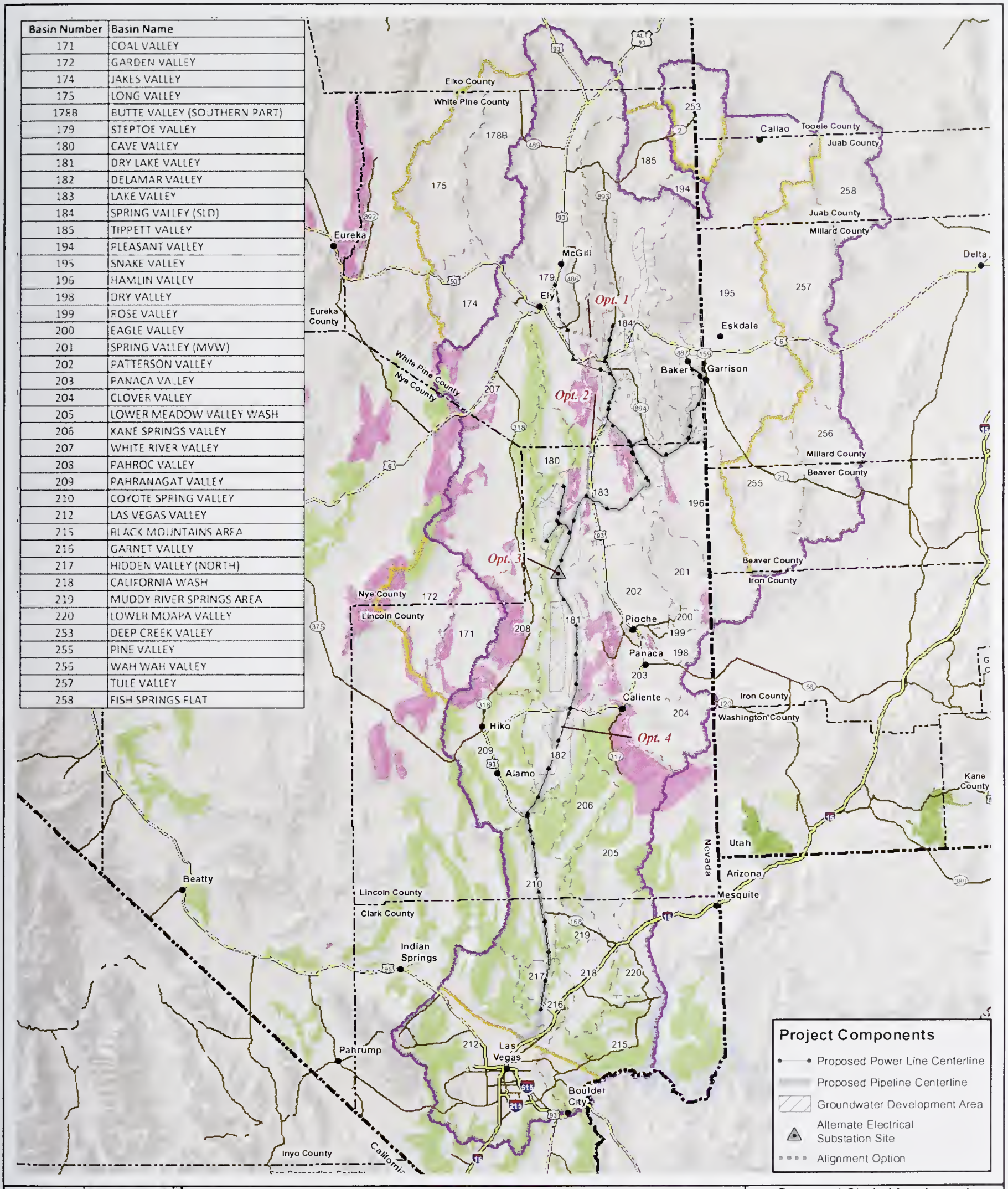
257	TULE VALLEY
258	FISH SPRINGS FLAT



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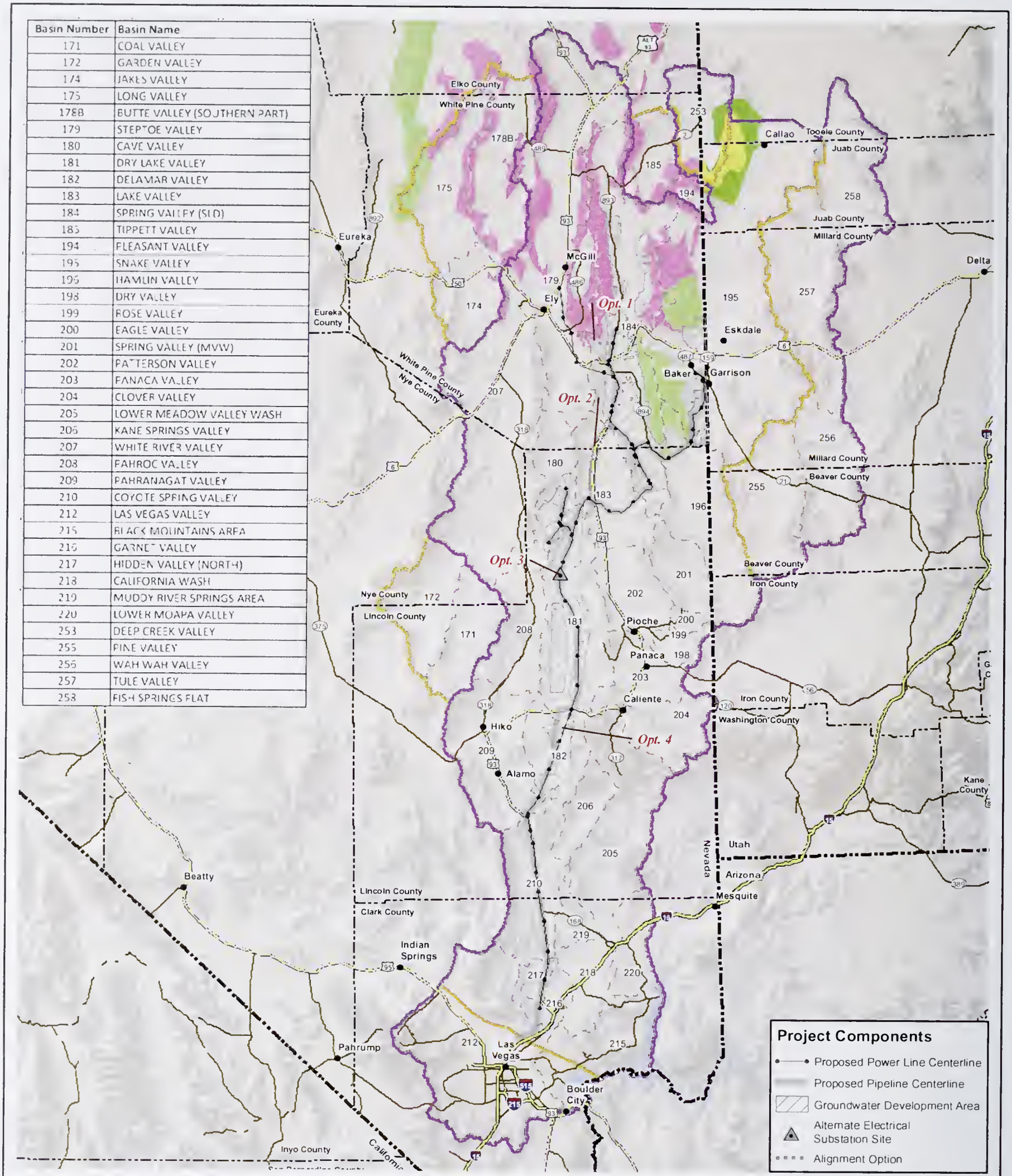

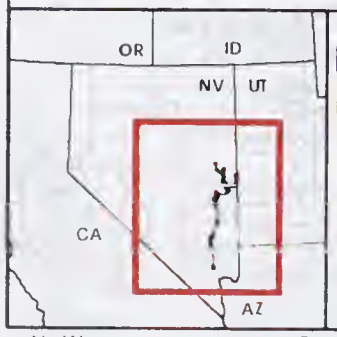

Natural Resources Region of Study
Water Resources Region of Study
Interstate Highway
US Highway
Major Road
State Boundary
County Boundary
Hydrographic Basins

Rocky Mountain Bighorn Sheep Habitat

Nevada
- Occupied Habitat
- Potential Habitat

Utah
- Year-long Substantial Range
- Spring/summer Crucial Range

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.6-5

Rocky Mountain Bighorn Sheep Habitat

0 10 20 40 60 Miles
0 15 30 60 Kilometers
1 inch equals 40 miles
N

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No waterfowl species of management concern have been documented along the ROWs, although the majority of these species have been documented or are suspected of occurring in at least one of the ROW basins. Marshlands comprise less than 1 percent of the land cover types crossed by the ROW. See Section 3.5, Vegetation Resources, for cover types in the ROW (**Table 3.5-1**).

Some of the more common migratory bird species that occur within the ROW include the neotropical migrants and raptors that are listed in **Appendix F**, **Table F3.6-1**. Additional migratory birds are included in the discussion of special status wildlife species. Based on **Table 3.5-1** in Vegetation Resources, the following list includes cover types and some management concern migratory bird species that are associated with these habitats. The cover types are listed in order of percent occurrence of this vegetative cover in the ROW within this cover type. The last four are habitats of interest that make up less than 1 percent of the ROW collectively:

- **Sagebrush shrubland** (48 percent) – sage sparrow and vesper sparrow;
- **Mojave mixed desert scrub** (25 percent) – cactus wren, crissal thrasher, Bendire's thrasher, and Le Conte's thrasher;
- **Greasewood/Salt Desert Shrubland** (24 percent) – sage sparrow;
- **Pinyon-juniper woodland** (2 percent) – black-throated gray warbler and gray vireo;

Less than 1 percent of the ROW collectively:

- **Marshland** – American avocet, mallard, Canada goose, Wilson's phalarope, willet, northern pintail, and common yellowthroat;
- **Perennial grassland** – grasshopper sparrow, vesper sparrow, horned lark, and boblink;
- **Playa** – American avocet; and
- **Riparian** – Canada goose, Costa's hummingbird, red-naped sapsucker, Williamson's sapsucker, bell's vireo, common yellowthroat, and yellow warbler.

There is one important bird area, Lower Meadow Valley Wash, which overlaps with the construction support site near Caliente (Lower Meadow Valley Wash Valley). The Pahranagat Valley Complex important bird area is approximately 0.2 mile to the west of the ROW in Pahranagat Valley, but it is not crossed by the ROW.

Special Status Wildlife Species

Special status wildlife species' occurrence data were reviewed for the ROWs and are identified in **Appendix F**, **Table F3.6-1**. The terrestrial wildlife species that are identified as special status in this section are federally threatened, endangered, or proposed, under the ESA, or considered sensitive by the BLM or USFS (note that only Alignment Option 1 crosses USFS lands). Information on section 7 consultation with BLM is addressed in Chapter 1. Habitat and life-history information for these species is provided in **Appendix F**, **Table F3.6-3**. Special status wildlife species or groups that are known to occur along the ROWs include desert tortoise, pygmy rabbit, greater sage-grouse, western burrowing owl, other special status raptors (golden eagle, bald eagle, ferruginous hawk,), other special status birds, ten bat species, dark kangaroo mouse, reptiles, and Mojave poppy bee. The following information summarizes the occurrence of these species within the ROWs. (The desert bighorn sheep is discussed under the species of management concern.) See **Appendix F**, **Table F3.6-1** for species status.

- **Desert Tortoise (Federally Threatened)** – The proposed ROWs cross habitat for one federally listed species, Agassiz's desert tortoise (desert tortoise), in five basins (Las Vegas, Garnett, Hidden Valley, Coyote Spring, and Pahranagat valleys). A portion of the tortoise habitat in this area has been designated as critical habitat for the desert tortoise and occurs in the Mormon Mesa Critical Habitat Unit of the Northeastern Mojave Recovery Unit (USFWS 1994a). There are 1,759 acres of critical habitat and 591 acres of non-critical habitat within project ROWs. According to the USFWS, tortoise densities are least abundant in the Northeast Mojave Recovery Unit (0.65–2.32 tortoises per square mile) compared to the other five recovery units, meaning low tortoise densities (USFWS 2006). Of the seven ACECs created by the Ely and Las Vegas BLM RMPs for the protection of desert

tortoise, two (Coyote Spring and Kane Spring ACECs) overlap the proposed ROWs. **Figure 3.6-6** displays USFWS critical habitat as well as USGS modeled potential habitat (Nussear et al 2009) for this species.

Many project-specific surveys have been conducted in the ROWs for ESA section 7 compliance with the USFWS. In general, the highest densities of tortoise sign were observed from Hidden Valley south to Las Vegas Valley. Densities of desert tortoise along the ROWs ranged from 0 to 45 along most of the ROWs, with one site recording 46 to 90 tortoises per square mile (Wildland International 2009).

The Fish and Wildlife Service created a team in 1990 to develop a plan that would direct the recovery of the desert tortoise. A team was created of nationally recognized scientists in desert tortoise biology, conservation biology, desert ecology, and disease of reptiles. The main goals of the recovery plan are to eliminate or reduce the threats existing to the desert tortoise and restore a wild population that can be self-sustaining and can be removed from the Endangered Species list. The Desert Tortoise (Mojave Population) Recovery Plan, June 1994 was then completed.

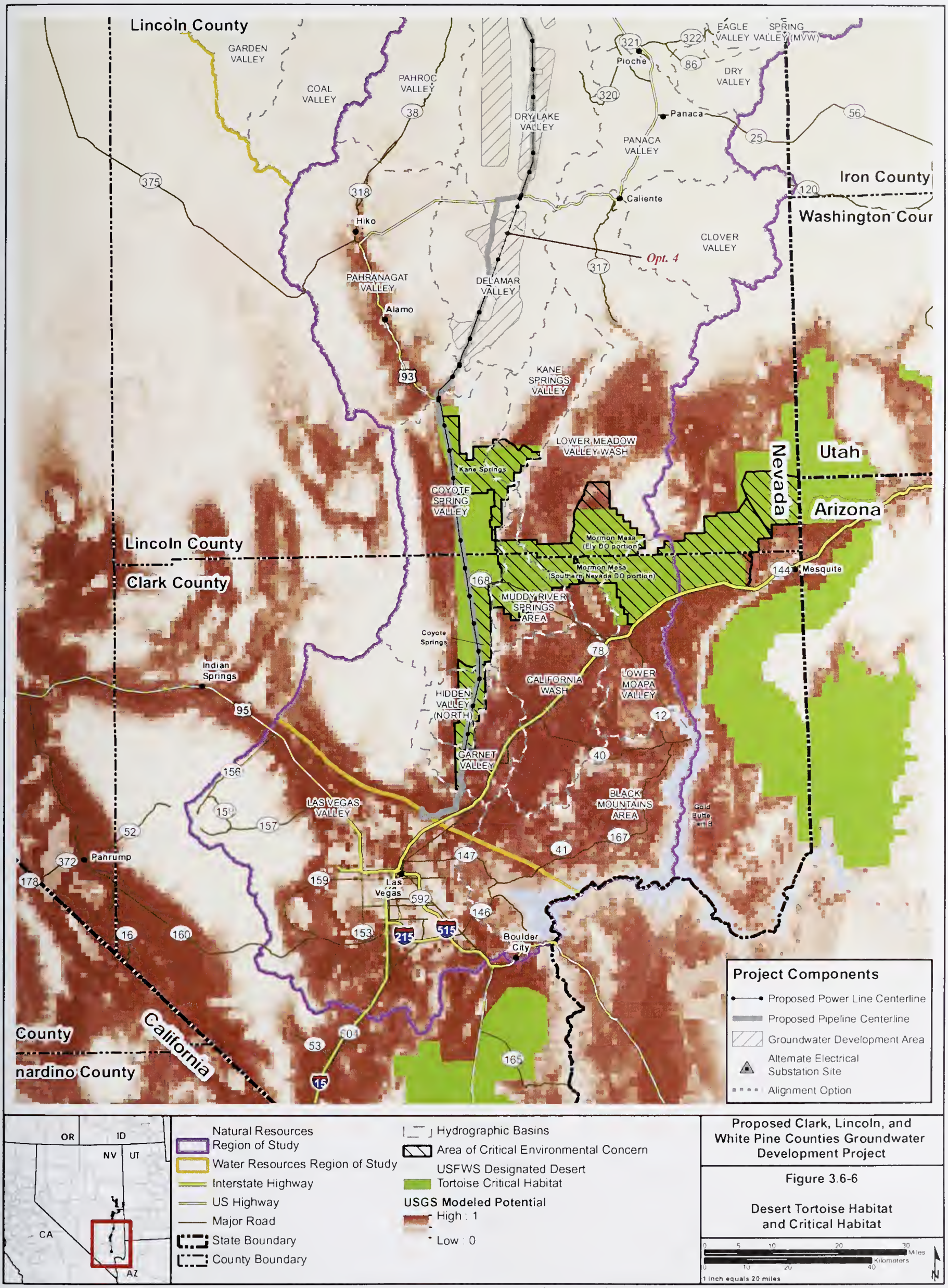
Due to the fact that much new information has become available and will likely result in changes to the recovery strategy for the desert tortoise, it was determined the 1994 plan needed to be revised. In 2003, the Desert Tortoise Recovery Plan Assessment Committee was appointed by the USFWS to conduct a comprehensive assessment of the Recovery Plan. In 2004, the Committee completed its assessment and prepared a report of its findings and recommendations. A draft of the final revised plan was completed and published for the comment period that started in August 2008 and ended in November 2008. The Revised Recovery Plan for the Mojave Population of the Desert Tortoise (*Gopherus agassizii*) was signed on May 6, 2011.

The 2011 Recovery Plan has developed actions that are designed to improve the 1994 Recovery Plan, as listed below:

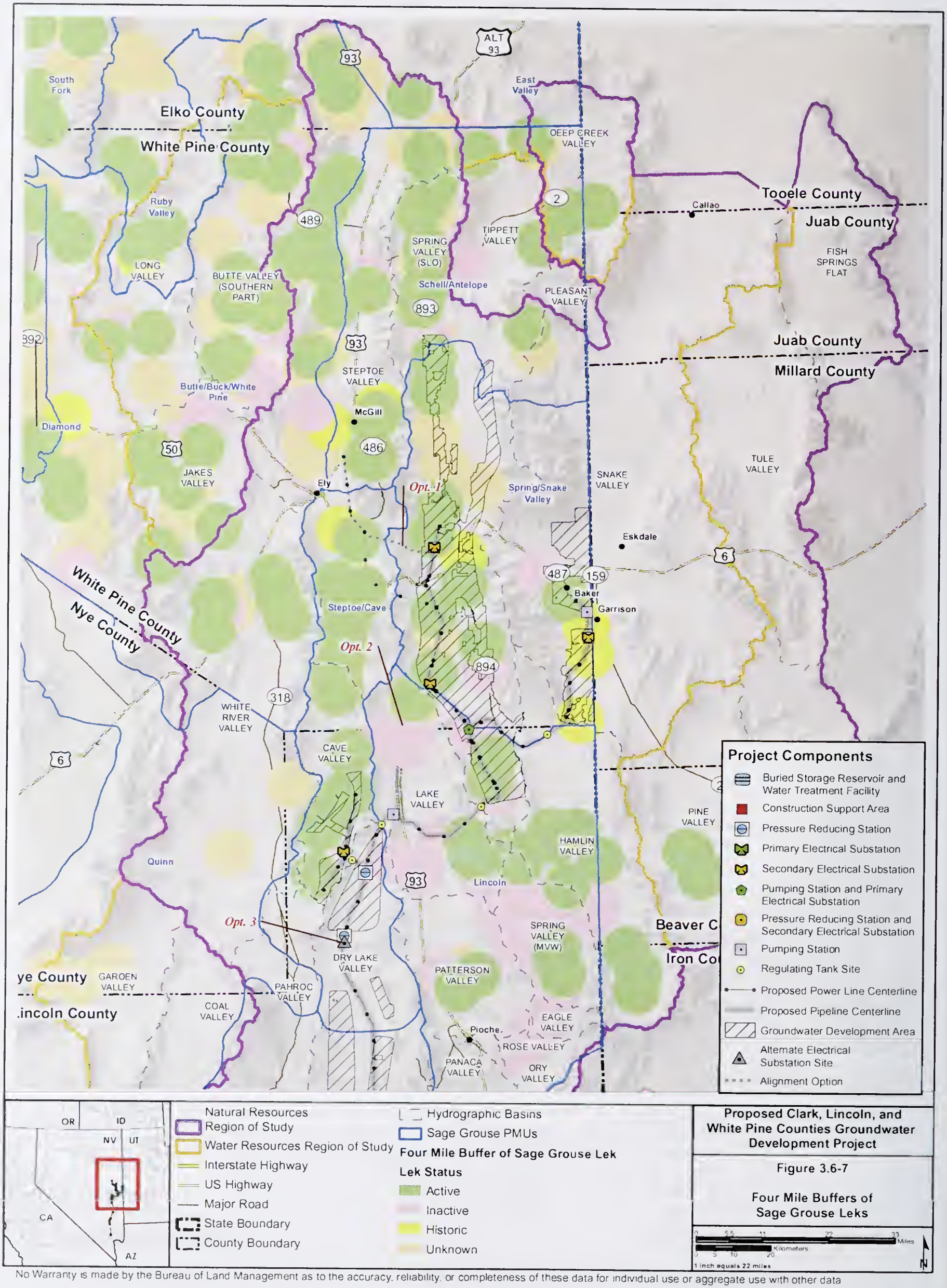
1. Develop, support, and build partnerships to facilitate recovery.
2. Protect existing populations and habitat, instituting habitat restoration where necessary.
3. Augment depleted populations in a strategic manner.
4. Monitor progress toward recovery.
5. Conduct applied research and modeling in support of recovery efforts within a strategic framework.
6. Implement a formal adaptive management program.

The recovery plan's goals are recovery and delisting of the desert tortoise. Recovery criteria should include the management or elimination of threats, addressing the six statutory (de-)listing factors listed above.

- **Greater Sage-grouse (Federal Candidate)** – Aerial and ground surveys that were conducted along the ROWs by SNWA (2007c) documented active greater sage-grouse leks in two valleys (Cave and Spring valleys). Additional active greater sage-grouse leks in Spring Valley were documented by the SNWA during a greater sage-grouse telemetry study (SNWA 2009a). The 2008 greater sage-grouse NDOW database identified active leks in Cave, Lake, Snake, Spring, Hamlin, and Steptoe valleys. **Figure 3.6-7** displays active, inactive, unknown, and historic leks, while **Figure 3.6-8** displays sage-grouse preliminary priority habitat (PPH) and preliminary general habitat (PGH). Thirty-one leks were identified within 4 miles of the proposed ROW. Of the 31 leks identified, 19 are considered active. Four of the 19 active lek sites were found within the Spring/Snake Valley population management unit (PMU) and within Spring Valley in White Pine County. These leks contained male counts ranging from 3 to 20 males in attendance. One active lek was found within the Spring/Snake Valley PMU unit within Snake Valley, with 5 males in attendance. Five active leks were found within the Cave PMU within Cave Valley, with male counts ranging from 0 to 24 males in attendance. Four active leks were found within the Lincoln PMU; two within Spring Valley with male counts ranging from 0 to 7 males in attendance, and two within Lake Valley with a male counts ranging from 0 to 2 males in attendance. Four active leks were found within the Steptoe/Cave PMU (Steptoe Valley), with male counts ranging from 0 to 3 males in attendance. One active lek was found within the Schell/Antelope PMU (Steptoe Valley), with 4 males in attendance.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data



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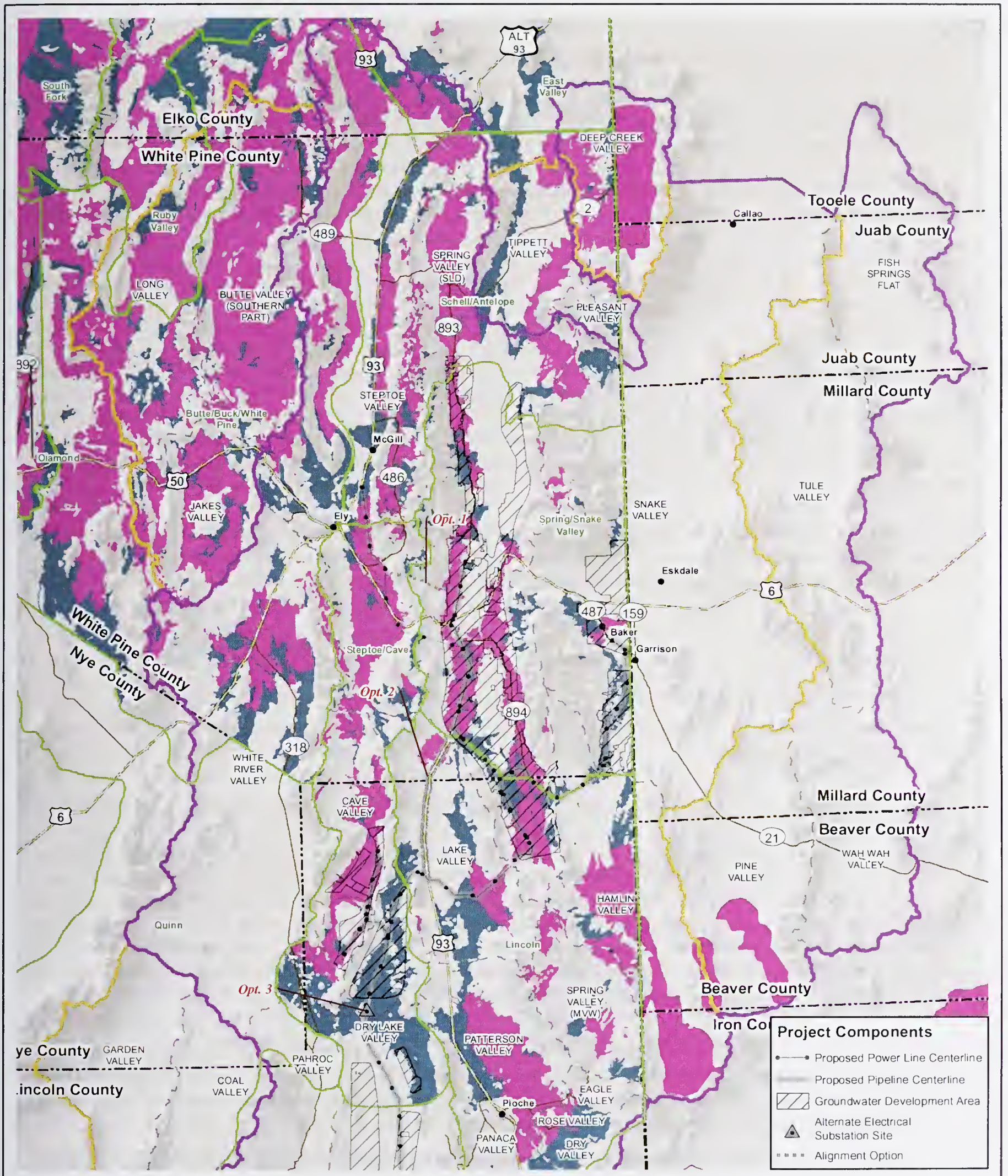

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

Greater sage-grouse typically occupy sagebrush communities, breeding in relatively open lek sites (or strutting grounds). Leks are established in open areas, 0.2 to 12 acres in size. Nesting habitat is characterized primarily by Wyoming big sagebrush communities with a 15- to 38-percent canopy cover and a grass-forb understory (NDOW and California Department of Fish and Game 2004). On average, most nests occur within 4 miles of a lek site; however, nesting habitat may occur at greater distances from a lek site for migratory populations (Connelly et al. 2000). Early brood-rearing generally occurs close to nest sites. Optimum brood-rearing habitat consists of sagebrush stands that are 16 to 32 inches tall, with a canopy cover of 10 to 25 percent and an herbaceous understory consisting of grass and forb species (BLM 2000). Sage-grouse breeding/nesting season occurs from March to May (BLM 2000) and brood rearing season falls between April and August.

Summer habitat consists of sagebrush mixed with areas of wet meadows, riparian habitat, or irrigated agriculture fields. As habitat begins to dry up, greater sage-grouse broods move to more mesic habitat, such as wet meadows, where succulent grasses and insects are still available. In Nevada, greater sage-grouse rely on wet areas for their survival, because Nevada typically receives less precipitation than other states. Fall habitat in northeastern Nevada consists of a mosaic of low-growing sagebrush and Wyoming big sagebrush. In both Nevada and Utah, it is crucial that sagebrush be exposed at least 10 to 12 inches above snow level for wintering greater sage-grouse. Sagebrush is the primary food source of adult greater sage-grouse; however, forb species are an important food source in spring and early summer and improve successful reproduction in females. Numerous forb species also enhance nest concealment and relative nest success (Wambolt et al. 2002). See **Table F3.6-3** in **Appendix F3.6** for additional life history and habitat requirement information.

In March 2012, NDOW prioritized greater sage-grouse habitat based on the best available data (lek observations, telemetry locations, survey and inventory reports, vegetation cover, soils information, and aerial photography). Greater sage-grouse habitat was categorized into the following five NDOW Categories:

1. Essential/Irreplaceable habitat,
2. Important habitat,
3. Habitat of moderate importance,
4. Low value habitat and transitional range, and
5. Unsuitable habitat.

In conformance with BLM Washington Office IM 2012-043 for Greater Sage-grouse Interim Management Policies and Procedures (BLM 2011a), the BLM Nevada identified NDOW Categories 1 and 2 as PPH and NDOW Category 3 as PGH. These designations of PPH and PGH will remain in effect until BLM completes the greater sage-grouse land use planning process in accordance with IM 2012-044 BLM National Greater Sage-grouse Land Use Planning Strategy and Attachment 1 (BLM 2011b) in 2014. At that time, BLM will refine PPH and PGH to:1) identify Priority Habitat to conserve and/or improve greater sage-grouse habitat functionality, and 2) identify General Habitat that provides for major life history functions in order to maintain genetic diversity needed to sustain greater sage-grouse populations. IM 2012-043 also directs the BLM to evaluate ROW applications, and if the BLM decides to authorize a project that will disturb greater than 1 linear mile or 2 acres the following process must be used:

- Require the ROW holder to implement measures to minimize impacts to sage-grouse habitat.
- In addition to onsite mitigation, the BLM will, to the extent possible, cooperate with the project proponents to develop and consider offsite mitigation that the BLM, coordinating with the respective state wildlife agency, determines would avoid or minimize habitat and population-level effects.
- Unless the BLM, in coordination with the respective state wildlife agency, determines the proposed project and mitigation measures would cumulatively maintain or enhance sage-grouse habitat, the proposed ROW decision must be forwarded to the BLM State Director, State Wildlife Agency Director, and USFWS representative for review.

IM 2012-043 further directs the BLM to evaluate the need for proposed fences, particularly those that are within 1.25 miles of leks that have been active in the last 5 years and in movement corridors between leks and roost locations.

- **Raptors** – Additional special status raptor species (golden eagle and ferruginous hawk) have been observed within or near the ROWs. Bald eagle is also addressed here in the raptors discussion.
  - Golden eagle has been recorded in the ROWs during winter surveys in Delamar, Dry Lake, Hamlin, and Spring valleys and also within the 0.5 mile buffer of the ROW in Steptoe Valley (GBBO 2007b; SNWA 2005-2008). NDOW's raptor nest database (2011) was searched for nest sites within the ROWs, as well as a 0.5 mile and 10 mile buffer of the ROWs. There is one golden eagle nest site recorded in 1978 that occurs within the 0.5 mile buffer in Pahranagat Valley. There are 13 nest sites recorded in the 10 mile buffer. Three of the 13 nests are located in Dry Lake Valley and were recorded in 2007; the remaining 10 nests were recorded in Hamlin, Pahranagat, Spring, and Steptoe valleys prior to 1981. NDOW surveys specific to the proposed project ROW found no golden eagle nests in the ROWs or with a 0.5 mile buffer (Klinger and Williams 2005). This species is protected under the Bald and Golden Eagle Protection Act (BGEPA). Habitat and life-history information for this species and subsequent species mentioned in this section is provided in **Appendix F**, **Table F3.6-3**.
  - Ferruginous hawk has been recorded during winter surveys within 0.5 mile of the ROWs in Delamar, Dry Lake, and Spring valleys (GBBO 2007b, SNWA 2005-2008). The NDOW raptor nest database has records of 6 nests in the ROWs in Hamlin and Spring valleys, all recorded before 1984. Within the 0.5-mile buffer, there are 40 nests recorded between 1977 and 1992 in Hamlin, Snake, Spring, and Steptoe valleys. There are 161 nests recorded within the 10-mile buffer recorded between 1976 and 1992. GWD Project-specific nest surveys conducted by the NDOW in 2005 found no active ferruginous hawk nests within the ROWs and 2 active nests within the 0.5-mile buffer, 1 each in Hamlin and Spring valleys (Klinger and Williams 2005).
  - Bald eagle is not known to nest in eastern Nevada (Floyd et al. 2007), but it does winter in basins crossed by the ROW. It has been recorded during winter surveys in Hamlin, Spring, and Snake valleys, but more than 0.5 mile outside the ROWs. This species is protected under the BGEPA.
  - Other special status raptor species that may be in the ROW include Swainson's hawk, peregrine falcon, and northern goshawk. See **Table F3.6-3** in **Appendix F** for life history and habitat requirement information on special status raptors.

- **Western Burrowing Owl** – This species has been recorded in or near the ROWs in seven valleys: Las Vegas, Coyote Spring, Delamar, Dry Lake, Hamlin, Snake, and Spring valleys (Wildland International 2007, 2009; NNHP 2011). There were 8 burrowing owl burrows recorded in 2003 (NNHP 2011) within 0.5 mile of the ROW; all in Las Vegas Valley. NDOW's raptor nest database has 4 burrows recorded within the 10 mile buffer; 2 each in Dry Lake and Spring valleys recorded between 1977 and 2000. Burrowing owls have been sighted throughout the state of Nevada, primarily breeding in salt desert scrub, Mojave shrub, and in some sagebrush habitat. They also are known to breed around the fringes of agricultural lands, using croplands and pasture lands for foraging during the breeding season. Burrowing owl dens can be very diverse with several tunnels and owl entrance and exit burrows. Burrowing owls winter most frequently in the southern half of Nevada but have been recorded throughout the state during all months (Klute et al. 2003). Population status and trends are not well understood for this species (GBBO 2010). See **Table F3.6 3** in **Appendix F** for additional life history and habitat requirement information. This species is discussed separately from other raptors throughout Section 3.6 because it nests in burrows.

- **Additional Special Status Bird Species** – Similar to the species addressed in the management concern section, a list of special status species associated with the various cover types from **Table 3.5-1** is provided below. See the management concern species section for information on important bird areas crossed and near the ROWs and **Table F3.6-3** in **Appendix F** for life history and habitat requirement information on other special status birds.
  - Sagebrush shrubland (48 percent) – loggerhead shrike and Brewer's sparrow;
  - Mojave mixed desert scrub (25 percent) – loggerhead shrike;
  - Greasewood/Salt Desert Shrubland (24 percent) – loggerhead shrike and Brewer's sparrow;
  - Pinyon-juniper woodland (2 percent) – pinyon jay;

Less than 1 percent of the ROW collectively:

- Marshland – western snowy plover;
- Perennial grassland – long-billed curlew;
- Playa – western snowy plover; and
- Riparian – common yellowthroat.

- **Pygmy Rabbit** – The project ROW crosses into the southern extent of the species' range (Himes and Drohan 2007). This species was observed in the ROWs within five basins (Dry Lake, Cave, Lake, Steptoe, and Spring valleys) (SNWA 2009a, 2007b). Pygmy rabbit also has been recorded in Dry Lake and Lake valleys during previous surveys (NNHP 2006). The species also has a reasonable expectation of occurrence in Hamlin Valley based on best available knowledge by wildlife management agencies; however, it has not been recorded in the ROWs. The majority of overlap of this species within the ROWs is in Spring Valley, although signs of pygmy rabbit have been observed throughout the northern portion of the ROWs.

Habitat includes broad valley floors, drainage bottoms, alluvial fans, and other areas with friable soils that are usually associated with rabbitbrush or sagebrush vegetation (SNWA 2007b). Generally, pygmy rabbits burrow in dense sagebrush areas with loamy soils that are deeper than 20 inches (Roberts 2001). Pygmy rabbits typically inhabit dense stands of big sagebrush growing in deep, loose soils. The understory of grasses and forbs in the habitat varies from sparse to dense. This species digs its own burrow, 4 to 10 inches in diameter (Ulmschneider et al. 2004) and deeper than 20 inches, primarily in loamy soils among taller and denser big sagebrush. However, other subspecies of sagebrush may be used as well (SNWA 2007b). Big sagebrush is the primary food source, but grasses and forbs are also consumed in mid- to late summer.

The species can be active during the entire year throughout the day and night, but generally tend to be active during twilight. The breeding period extends from spring to early summer.

- **Bats** – Ten bat species have been recorded in or near the ROWs (big brown, Brazilian free-tailed, California myotis, fringed myotis, hoary bat, long-eared myotis, long-legged myotis, pallid bat, western pipistrelle, and western small-footed myotis). Additional special status bat species have been identified as having reasonable expectation of occurrence based on best available knowledge by wildlife management agencies within basins crossed by the ROWs (ENSR/AECOM 2008) (**Appendix F, Table F3.6-1**). See **Table F3.6-3** in **Appendix F** for more information on life history and habitat requirements of these bat species.

- **Dark Kangaroo Mouse** –The NDOW has records of the species dark kangaroo mouse in ROWs in Cave, Dry Lake, Hamlin, and Spring valleys. Generally, the dark kangaroo mouse inhabits areas with loose sands and gravel, and may occur in sand dunes near the margins of its range. It is found in shadscale scrub, sagebrush scrub, and alkali sink plant communities in the Upper Sonoran life zone (Wildlife Action Plan Team 2006). This species primarily feeds on seeds, but it may also consume insects. It does not appear to utilize surface water. Food is likely stored in seed caches within burrow systems. The species is active from March through October. Peak nocturnal activity occurs during the first 2 hours after sunset. Activity level is influenced by ambient temperature and moonlight. Individuals remain underground in burrows when inactive and are believed to hibernate. The majority of young are born in May and June, with litter size ranging from two to seven (O'Farrell 1974). The range of the pale kangaroo mouse, another special status species, falls outside of ROW areas (USGS 2007).

- **Reptiles** – The banded Gila monster has been observed in a number of the basins crossed by the ROWs (Coyote Spring, Garnet, Hidden Valley, Las Vegas, and Pahranagat valleys). Common chuckwalla also is found in these same valleys and was recorded along a power line ROW in Coyote Spring Valley. Mojave Desert sidewinder has been recorded in the ROW in Coyote Springs Valley. These species are known or suspected within or near ROWs. The types of vegetation communities that these species inhabit include desert grassland, Mojave and Sonoran desert scrub, and thorn scrub (NatureServe 2010). See **Table F3.6-3** in **Appendix F** for more information on life history and habitat requirements of these special status reptile species.

- **Terrestrial Invertebrates** – Based on January 2010 Nevada Natural Heritage data and the Ecological Sciences, Inc. (2007) study, there are five BLM sensitive terrestrial invertebrate species that occur in valleys crossed by the

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ROWs. These species are the White River wood nymph (Lake Valley), Baking Powder Flat blue butterfly (Spring Valley), Mojave poppy bee (Coyote Spring Valley), Steptoe Valley crescentspot (Steptoe Valley), and Koret's checkerspot (Snake, Spring, and Steptoe valleys). Of these invertebrate species, only the Mojave poppy bee (Coyote Spring Valley) has been recorded within the ROWs. The Mojave poppy bee only utilizes plants in the poppy family for pollen (Tepedino 2000). See **Table F3.6-3** in **Appendix F** for more information on life history and habitat requirements of these special status species.

Alignment Options 1 through 4

Wildlife resources within the four alignment alternatives (Alignment Options 1 through 4) are summarized in the following sections. The dominant types of wildlife habitat are noted, as well as any differences in wildlife use for the alignment alternatives, compared to the Proposed Action segment. Additionally, based on surveys that were conducted by Wildland International (2009, 2007), special status wildlife species that could occur within or near the alignment Alternatives (F through I) include the following:

- **Alignment Option 1 (Humboldt-Toiyabe Power Line)** – This alternative would align a segment of the proposed power line adjacent to other existing power lines across the Humboldt-Toiyabe National Forest rather than create a new corridor for the power line to the south. Habitat consists of higher-elevation montane shrubland, compared to Great Basin pinyon-juniper woodland and xeric sagebrush shrubland along the Proposed Action segment. This alternative contains potential Rocky Mountain bighorn sheep and elk crucial summer range, which are not present along the Proposed Action segment. This alignment would avoid passing within 4 miles of 3 active leks as compared to the the Proposed Action alignment. Special status species include pinyon jay and Brewer's sparrow.
- **Alignment Option 2 (North Lake Valley Pipeline and Power Line)** – Habitat mainly consists of big sagebrush shrubland and grassland (the same as the Proposed Action). Big-game ranges are the same as those that would be crossed by the Proposed Action. This alternative passes within 4 miles of 1 additional active greater sage-grouse lek sites as compared to the Proposed Action. Special status species include long-billed curlew, pygmy rabbit, and White River wood nymph (Lake Valley). Little information on habitat is known about the White River wood nymph subspecies (see **Table F3.6-1** in **Appendix F** for additional information on the White River wood nymph).
- **Alignment Option 3 (Muleshoe Substation and Power Line)** – The predominant habitat is mixed desert shrubland (the same as the Proposed Action). This alternative would avoid passing within 4 miles of 5 active greater sage-grouse lek sites in Steptoe Valley, as compared to the Proposed Action. Special status species include pygmy rabbit, western burrowing owl, pinyon jay, and Brewer's sparrow.
- **Alignment Option 4 (North Delamar Valley Pipeline and Power Line)** – Habitat is dominated by big sagebrush shrubland and desert shrub steppe (the same as the Proposed Action). Special status species include the western burrowing owl. This alternative is the same as the Proposed Action with regard to impacts to active sage-grouse leks.

3.6.1.3 Groundwater Development Areas

Groundwater development areas are proposed in five basins: Snake, Spring, Delamar, Dry Lake, and Cave valleys. There are no groundwater development areas in Utah.

Species of Management Concern

Five big game mammals of management concern are known to occur within the groundwater development areas. Range information shown on **Figures 3.6-1** through **3.6-5** is based on the NDOW (2004, 2010b). Overlap between bighorn sheep habitat and groundwater development areas are shown, but given that habitat for bighorn sheep is generally at higher elevations and groundwater development facilities will most likely be placed in valleys, overlap when actual future groundwater facilities are proposed is not anticipated. The following big game species are found in the groundwater development project areas:

- **Pronghorn Antelope (Figure 3.6-1)** – Year-round range for antelope overlaps all of the groundwater development areas. Crucial winter range is crossed by the groundwater development areas in Spring Valley.

- **Rocky Mountain Elk (Figure 3.6-2)** – Year-round elk range overlaps with the groundwater development areas in Dry Lake, Cave, Snake, and Spring valleys.
- **Mule Deer (Figure 3.6-3)** – Year-round mule deer range overlaps with all five of the groundwater development areas. Crucial summer range occurs in Cave, Dry Lake, Spring, and Snake valleys; crucial winter range overlaps the groundwater development areas in Dry Lake and Spring valleys.
- **Desert Bighorn Sheep (Figure 3.6-4)** – Occupied habitat occurs within the groundwater development areas in Dry Lake, Delamar, and Cave valleys. Potential habitat overlaps the groundwater development areas in Cave, Delamar, and Spring valleys.
- **Rocky Mountain Bighorn Sheep (Figure 3.6-5)** – Occupied and potential habitat for Rocky Mountain bighorn sheep overlaps the groundwater development areas in Spring and Snake valleys.

Of the nine small mammals of management concern, five may occur in groundwater development areas (Merriam's shrew, vagrant shrew, brush mouse, kit fox, and ringtail). Given species range or habitat use, water shrew, Inyo shrew, desert kangaroo rat, and desert pocket mouse are unlikely to occur in groundwater development areas. GWD Project-specific surveys have recorded dark kangaroo mouse in groundwater development areas in Dry Lake, Cave, and Spring valleys. Kit fox habitat occurs in groundwater development areas in all five basins (USGS 2007).

One of the representative raptor species of management concern, the northern harrier, was recorded within groundwater development areas in all five basins (SNWA 2005-2008) and an active nest site (NDOW 2011) was recorded within a groundwater development area in Spring Valley. Flammulated owl has been recorded in groundwater development areas in Spring and Snake valleys and short-eared owl has been recorded in a groundwater development area in Spring Valley. Prairie falcon has been recorded during winter surveys in groundwater development areas in Delamar, Dry Lake, and Spring valleys (GBBO 2007b; SNWA 2005-2008); and also in Snake Valley in the 0.5-mile groundwater development area buffer. The NDOW raptor nest database has 3 prairie falcon nest records from Snake and Spring valleys, all recorded prior to 1980 within the groundwater development areas. There are an additional 4 nests in the 0.5-mile buffer; all 4 recorded before 1982 within the same 2 valleys. The 10-mile groundwater development area buffer has records for 18 nests in five basins (Pahroc, Snake, Spring, Steptoe, and White River valleys), all recorded before 1982.

Mourning dove has been documented in groundwater development areas in three basins (Cave, Snake, and Spring valleys) and is suspected to occur in the other two basins. Band-tailed pigeon has not been recorded in the groundwater development areas, although it could occur there.

Other management concern migratory bird species are found in groundwater development areas. Cover types in the groundwater development areas are similar to those in the ROWs (**Table 3.5-3**, Vegetation Resources). See the ROW management concern species earlier in this section for examples of birds that could occur in these habitats in groundwater development areas as well as **Table F3.6-1** in **Appendix F** for information on basins of suspected occurrence.

No important bird areas are crossed by groundwater development areas, although GBNP and D.E. Moore Bird and Wildlife Sanctuary important bird areas share a boundary with a groundwater development area in Snake Valley. The Northern Snake Range important bird area is located within 2 miles of groundwater development areas in Snake and Spring valleys.

Special Status Wildlife Species

Based on a review of occurrence data for special status wildlife, species occurrences were identified for the groundwater development areas (**Appendix F**, **Table F3.6-1**). The terrestrial wildlife species that are identified as special status in this section are federally threatened, endangered, or proposed under the ESA or are considered sensitive by the BLM or the USFS. There are 36 special status species that have been recorded within groundwater development areas (**Appendix F**, **Table F3.6-1**). Habitat and life history information for these species is provided in **Appendix F**, **Table F3.6-3**.

Special status wildlife species or groups that have habitat in the groundwater development areas include greater sage-grouse, pygmy rabbit, bats, dark kangaroo mouse, golden eagle, bald eagle, western burrowing owl, ferruginous hawk, other special status migratory birds, and Baking Powder Flat blue butterfly. There is no desert tortoise habitat in the groundwater development areas. Based on surveys that were conducted by Wildland International (2007), the banded Gila monster has not been observed in any of the groundwater development areas. Based on the Southwest ReGap animal models and NNHP heritage records, neither Gila monster nor common chuckwalla have habitat in these areas. The following information summarizes the occurrence of pygmy rabbit, greater sage-grouse, raptors, additional special status birds, and terrestrial invertebrates within the groundwater development areas. (The desert bighorn sheep is discussed under the species of management concern.)

- **Greater Sage-grouse** – Habitat for this species is located in three of the groundwater development areas (Cave, Snake, and Spring valleys). Active, inactive, and historic breeding areas within 4 miles of groundwater development areas are shown in **Figure 3.6-7**. Twenty-seven leks were identified within the boundaries of the proposed groundwater development areas. Of the 27 leks identified, 13 are considered active. Nine of the 13 active lek sites are found within the Spring/Snake Valley PMU and within Spring Valley in White Pine and Lincoln counties. Male counts in these leks ranged from 3 to 30. There is one active lek within the Spring/Snake Valley PMU within Snake Valley with five males in attendance. There are two active leks within the Lincoln PMU within Spring Valley. Male counts ranged from two to five males in attendance. One active lek is found within the Cave PMU within Cave Valley. This lek had a count of 10 males in attendance. An additional 7 active leks are found within 4 miles of groundwater development areas. Five are found within the Cave PMU within Cave Valley with male attendance numbers ranging from 0 to 24 and 1 other is found in the Lincoln PMU within Lake Valley with 0 males in attendance. The PPH and PGH habitats that have been mapped by the BLM overlap the groundwater development basins (**Figure 3.6-8**).
- **Raptors** – Additional special status raptor species (golden eagle, bald eagle, ferruginous hawk, and northern goshawk) have been observed within the groundwater development areas.
  - Golden eagle has been recorded in groundwater development areas in Dry Lake, Delamar, Spring, and Snake valleys during winter surveys (GBBO 2007b; SNWA 2005-2008). The NDOW raptor nest database has a 1980 record for a nest in a groundwater development area in Snake Valley. No additional nest sites are recorded in the 0.5 mile groundwater development area buffer. There are 15 nests in the NDOW raptor database within the 10 mile groundwater development area buffer; 3 nests were recorded in 2007 in Dry Lake, Pahranagat, and Pahroc valleys and the other 12 nests were recorded prior to 1981 in Dry Lake, Hamlin, Pahranagat, Snake, Spring, and Steptoe valleys. Habitat and life-history information for this species and subsequent species mentioned in this section is provided in **Appendix F**, **Table F3.6-3**.
  - Bald eagle has been recorded during winter surveys in groundwater development areas in Snake and Spring valleys (GBBO 2007b; SNWA 2005-2008) and in Spring valley in the 0.5 mile groundwater development area buffer. This species is not known to nest in eastern Nevada.
  - Ferruginous hawk has been recorded in Dry Lake, Hamlin, Snake, and Spring valleys (NNHP 2006; Klinger and Williams 2005; GBBO 2007b; SNWA 2005-2008). The NDOW raptor nest database has 70 nests within the groundwater development areas all recorded prior to 1993. There is 1 nest in Snake Valley recorded in 1977 and 69 nests in Spring Valley dating from 1976 to 1992. In the 0.5 mile buffer an additional 6 nests are recorded; 3 in Spring Valley, 2 in Hamlin Valley, and 1 in Dry Lake Valley, all recorded prior to 1993. More recent surveys by NDOW (Klinger and Williams 2005) recorded 5 active ferruginous hawk nests in groundwater development areas in Snake and Spring valleys and three additional ferruginous hawk nests within a 0.5 mile buffer of groundwater development areas in Hamlin and Spring valleys. The 10 mile buffer of groundwater development areas has records for 162 nests recorded between 1972 and 2001 in Dry Lake, Hamlin, Lake, Snake, Spring and Steptoe valleys.
  - Northern goshawk has been recorded in a groundwater development area in Spring Valley (GBBO 2007a). The NDOW raptor nest database does not contain records for this species in groundwater development areas, the 0.5-mile or 10-mile buffers.
  - NDOW's raptor nest site database also contains a short-eared owl nest record from 1978 that falls within a groundwater development area in Spring Valley. Habitat and life-history information for special status raptors is provided in **Appendix F**, **Table F3.6-3**.

- **Western Burrowing Owl** – This species has been recorded during surveys in groundwater development basins in three valleys: Dry Lake, Snake, and Spring (Wildland International 2009, 2007). The NDOW's raptor nest site database has records of four burrows recorded between 1982 and 2000 within groundwater development areas in Dry Lake, Snake, and Spring valleys. See **Table F3.6-3** in **Appendix F** for additional species habitat and life-history information.
- **Additional Special Status Bird Species** – Other special status bird species (e.g. pinyon jay and loggerhead shrike) are found in groundwater development areas. Cover types in the groundwater development areas are similar to those in the ROWs (**Table 3.5-3**, Vegetation Resources). See the ROW special status species earlier in this section for examples of birds that could occur in these habitats in groundwater development areas as well as **Table F3.6-1**, **Appendix F** for information on basins of occurrence.
- **Pygmy Rabbit** – This species was observed in four valleys within the groundwater development areas: Dry Lake, Cave, Spring, and Snake valleys (Wildland International 2007; SNWA 2009a, 2007b). Pygmy rabbit also has been recorded in Dry Lake Valley in previous surveys (NNHP 2006) and by the NDOW in Cave, Spring, and Snake valleys.
- **Bats** – Of the 22 species of bats that occur in the area, 18 have been recorded within groundwater development areas and many have been recorded in at least 1 of the valleys where groundwater development areas are located. See **Tables F3.6-1** and **F3.6-3** in **Appendix F** for basins of occurrence and habitat information.
- **Dark Kangaroo Mouse** – This species is recorded in groundwater development areas in Cave, Dry Lake, and Spring valleys (NDOW 2010a).
- **Terrestrial Invertebrates** – There is one BLM sensitive terrestrial invertebrate species, the Baking Powder Flat blue butterfly, recorded in Spring Valley within a groundwater development area (NNHP 2010). The other five BLM sensitive terrestrial invertebrate species have not been recorded, nor are they suspected to occur in groundwater development areas. This butterfly species is only known from Baking Powder Flat in Spring Valley and its host plant is Shockley's buckwheat (Austin 1998). See **Table F3.6-3** in **Appendix F** for additional species information.

3.6.1.4 Region of Study

The overall natural resources region of study is a large geographical area, within which the focus for terrestrial wildlife is on habitats that are water dependent (i.e., wetland, riparian, and phreatophytic communities). Spring systems and associated species are discussed in Section 3.7, Aquatic Biological Resources. The same habitat types that are discussed for the ROWs and groundwater development areas occur in the natural resources region of study. Therefore, the focus of this section is on Great Basin and Mojave Desert riparian and playa communities and habitats associated with surface water. Cave habitats also are discussed, because of their unique biological characteristics and public interest. Please note the natural resources region of study differs slightly from the water resources region of study discussed in Section 3.3, Water Resources. This is explained in more detail in Section 3.5, Vegetation Resources. These regions of study boundaries are depicted on **Figures 3.5-3** and **3.5-4**.

Wildlife Species of Management Concern

Management guidance for species of management concern is described in state management plans (**Table 3.6-1**). In addition to the species-specific management guidance documents that are listed in **Table 3.6-1**, the Clark County Multiple Species Habitat Conservation Plan (RECON 2000) and the Lower Colorado River Multiple Species Conservation Program (2004) cover some of these species. Many of these species also are covered in the Nevada Wildlife Action Plan (Wildlife Action Team 2012, 2006) and the Utah Comprehensive Wildlife Conservation Strategy (Sutter et al. 2005). Multiple bird species are covered in Landbirds of Nevada and the Habitats They Need (GBBO 2005), Atlas of the Breeding Birds of Nevada (Floyd et al. 2007), Nevada Partners in Flight Bird Conservation Plan (Nevada Partners in Flight 1999), Utah Partners in Flight Avian Conservation Srategy Version 2.0 (Parrish et al. 2002) and the Partners in Flight North American Landbird Conservation Plan (Rich et al. 2004). In addition, the American avocet is discussed in the U.S. Shorebird Conservation Plan (Brown et al. 2001) and the Intermountain West Regional Shorebird Plan (Oring et al. 2000). Most of the mammal, bird, and reptile species have been mapped as part of the Provisional Digital Animal-Habitat Models for the Southwestern U.S. (USGS 2007).

Five big-game mammals of management concern occur within the natural resources region of study in the following areas. Pronghorn antelope and elk occur in approximately half of the hydrologic basins in the study region (18 basins); mule deer are present in 26 of the 33 hydrologic basins in the study region. Desert bighorn sheep occur in all but six of the hydrologic basins, but Rocky Mountain bighorn sheep occur in only five of the basins within the study region. Species distribution for the species of management concern is identified, by hydrologic basin, in **Appendix F**, **Table F3.6-1**. Habitat requirements and life-history information for these species is provided earlier in this section and in **Appendix F**, **Table F3.6-2**.

Table 3.6-1 Management Guidance for Species of Management Concern

Species	Plan/Citation
Pronghorn	Policy for the Management of Pronghorn Antelope (Nevada Board of Wildlife Commissioners 2003); Nevada's Pronghorn Antelope – Ecology, Management and Conservation (Tsukamoto 1983); Utah Pronghorn Statewide Management Plan (UDWR 2009a)
Elk	Nevada Elk Species Management Plan (NDOW 1997); Lincoln County Elk Management Plan (NDOW 2006a); White Pine County Elk Management Plan - Revision (NDOW 2007a); Utah Division of Wildlife Resources Statewide Management Plan for Elk (UDWR 2005)
Mule deer	Management Plan for Mule Deer (NDOW 2006b); Utah Division of Wildlife Resources Statewide Management Plan for Mule Deer (UDWR 2003)
Desert and Rocky Mountain bighorn sheep	Bighorn Sheep Management Plan (NDOW 2001); Utah Division of Wildlife Resources Bighorn Sheep Statewide Management Plan (UDWR 2008)

Small mammals of management concern occur throughout the natural resources region of study. Those species that are dependent on wetland or phreatophytic vegetation are of particular interest (e.g. vagrant shrew and water shrew). The 9 representative management concern species are discussed earlier in this section in the ROW and groundwater development sections. Basins of occurrence and habitat and life history information for the species can be found in **Appendix F**, **Tables F3.6-1** and **F3.6-2**. Similarly, representative upland game birds, waterfowl, and other migratory birds of management concern are addressed earlier in the section and in appendix tables.

There are a number of important bird areas within the natural resources region of study. In Nevada, Lake Mead National Recreation Area, Virgin River, Moapa Valley, Meadow Valley Wash, Sheep Range, Pahranagat Valley complex, GBNP, D.E. Moore Bird and Wildlife Sanctuary, and Northern Snake Range important bird areas are within the region of study (Audubon 2010a). In Utah, the Fish Spring NWR important bird area is within the region of study (Audubon 2010b).

Special Status Wildlife Species

The occurrence of special status wildlife species within the natural resources region of study is listed by basin in **Appendix F**, **Table F3.6-1**. Federally listed species are shown in **Appendix F**, **Figure F3.6-1**. The region of study contains habitat for three federally listed terrestrial wildlife species (e.g., southwestern willow flycatcher, Yuma clapper rail, and desert tortoise).

Management guidance for special status terrestrial species is described in recovery plans, habitat management plans, and conservation agreements (**Table 3.6-2**). In addition, the western snowy plover and long-billed curlew are discussed in the U.S. Shorebird Conservation Plan (Brown et al. 2001) and the Intermountain West Regional Shorebird Plan (Oring et al. 2000), and bats are discussed in NDOW's Bat Conservation Plan (Bradley et al. 2006).

A summary of the occurrence and habitat information for the federally listed species is provided here. This section is followed by a summary of the BLM sensitive species or groups, with more detailed discussions for those species that have conservation agreements or public scoping interest. Many BLM sensitive species occur in the overall region of study; 71 species are addressed in **Appendix F**, **Table F3.6-1** and have potential to be impacted by construction or operation of the proposed project. Detailed occurrence information is provided for the greater sage-grouse and yellow-billed cuckoo, as they are federal candidate species. Raptors, bats, pygmy rabbit, and terrestrial invertebrates also are discussed. Habitat and life history information for the other special status species is provided in **Appendix F**, **Table F3.6-3**.

- **Southwestern Willow Flycatcher (Federally Endangered)** – The range of this subspecies in Nevada is confined to the southern portion of the state (Las Vegas, Pahranagat, Lower Meadow Valley Wash, Muddy River Springs Area, Lower Moapa valleys, and Black Mountains area). Designated critical habitat for this subspecies occurs near the natural resources region of study, approximately 6.5 miles northeast of Lower Moapa Basin along the Virgin River (USFWS 1997). The USFWS is currently reviewing the Revised Proposed Critical Habitat for southwestern willow flycatcher. The final rule is expected to be published on December 14, 2012 (USFWS 2012a). Revised Proposed Critical Habitat occurs within the natural resources region of study, within Pahranagat valley. The final recovery plan for the southwestern willow flycatcher was published in 2002 (USFWS 2002).

Table 3.6-2 Management Guidance for Special Status Terrestrial Wildlife Species

Species	Plan/Citation
Southwestern willow flycatcher (Federally Endangered)	Southwestern Willow Flycatcher Recovery Plan (USFWS 2002); Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for the Southwestern Willow Flycatcher (*Empidonax traillii extimus*) (USFWS 2005), Review of Revised Proposed Critical Habitat for Southwestern Willow Flycatcher underway, final rule is expected to be published on December 14, 2012.
Yuma clapper rail (Federally Endangered)	Yuma Clapper Rail Recovery Plan (USFWS 1983)
Greater sage-grouse (Federal Candidate)	Greater Sage-grouse Conservation Plan for Nevada and Eastern California (NDOW and California Department of Fish and Game 2004); Utah Greater Sage-grouse Statewide Management Plan (UDWR 2009b); Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats (Connelly et al. 2004); Lincoln County Sage-grouse Conservation Plan (Lincoln County Technical Review Team 2004); White Pine County Portion (Lincoln/White Pine Planning Area) Sage-grouse Conservation Plan (Sage-grouse Technical Review Team 2004); IM 2012-043 BLM Greater Sage-grouse Interim Management Policies and Procedures (BLM 2011a); IM 2012-044 BLM National Greater Sage-grouse Land Use Planning Strategy and Attachment 1(BLM 2011b); Nevada Energy and Infrastructure Development Standards to Conserve Greater Sage-grouse Populations and their Habitats (Nevada Governor's Sage-Grouse Conservation Team [NGSCT] 2010).
Bald eagle (BLM sensitive species)	Pacific States Bald Eagle Recovery Plan (USFWS 1986)
Desert tortoise (Federally Threatened)	Endangered and Threatened Wildlife and Plants: Determination of Critical Habitat for the Mojave Population of the Desert Tortoise (USFWS 1994b); Revised Recovery Plan for the Mojave Population of the Desert Tortoise (*Gopherus agassizii*) 2011.

The southwestern willow flycatcher breeds in dense patches of riparian habitat along streams or other wetland areas, near or adjacent to surface water or saturated soils. Nesting habitat in Nevada includes willow species like coyote willow *(Salix exigua),* Gooding's willow *(Salix gooddingii),* and seep willow (*Baccharis salicifolia*). The birds also nest in other tree species including ash *(Fraxinus spp.)* and Russian olive *(Eleagnus angustifolia).* Relative to the overall region of study, reported suitable breeding habitat for the southwestern willow flycatcher is limited to riparian shrub and wetland habitat within the Pahranagat Valley and Lower Moapa Valley hydrologic basins, as well as along the Lower Meadow Valley Wash. In the study area, southwestern willow flycatchers have been detected in numerous locations in Lincoln County in the Pahranagat Valley on Pahranagat NWR (Koronkiewicz et al. 2006), from 1999–2007 and 2010 on Key Pittman WMA (NDOW 2007b; McLeod and Pellegrini 2011), and on private land in the valley (NDOW 2007b).

The population of southwestern willow flycatchers in the Pahranagat Valley is important to the Lower Colorado Recovery Unit. In 2005, more than 25 percent of breeding territories in this Recovery Unit occurred in the Pahranagat Valley (Durst et al. 2006; Koronkiewicz et al. 2006; NDOW 2007b). In 2005, 19 nests were detected in Pahranagat NWR (Koronkiewicz et al. 2006) and 11 nests at Key Pittman WMA (NDOW 2006c); in 2008, 10 nests were detected in Pahranagat NWR; and in 2010, 20 and 31 nests were found at Pahranagat NWR and Key Pittman WMA, respectively (McLeod and Koronkiewicz 2009; McLeod and Pellegrini 2011). Sporadic breeding occurs along Meadow Valley Wash in Clark and Lincoln counties; breeding was last detected in 1998 (BIO-WEST 2005). In total, approximately 714 acres of woody vegetation types were delineated as potential habitat for this species in Meadow

Valley Wash (BIO-WEST 2005). Consistent surveys have not been conducted in this drainage. Other breeding locations within the study area in Clark County are along the upper and lower Muddy River, particularly in Overton WMA where 4 nests were detected in 2010 and the Warm Springs Natural Area where 3 nests were found in 2010. (Koronkiewicz et al. 2006; NDOW 2007b; McLeod and Pellegrini 2011). Willow flycatcher migrants have been detected along Las Vegas Wash (McLeod et al. 2007), although it is unclear if these birds are southwestern willow flycatchers or a different subspecies.

- **Yuma Clapper Rail (Federally Endangered)** – Yuma clapper rails are primarily known from Arizona and California. Observation records from Braden et al. (2008) report sightings at three sites within Nevada, one of which was along the Virgin River north of Mesquite. No new clapper rail sitings were reported in 2008 within Nevada (Braden et al. 2009). No critical habitat has been designated for this subspecies.

  Habitat for this species includes freshwater marshes with dense stands of cattails and bulrushes, dominated by stands of emergent vegetation interspersed with areas of open water and drier, upland benches. Mature stands of emergent vegetation along the margins of shallow ponds with stable water levels are preferred. Nests are built on dry hummocks or in small shrubs among dense vegetation on the edge of shallow ponds in marshy areas. Relative to the region of study, the species has been reported only from the Las Vegas, Lower Moapa, and Black Mountains hydrologic basins. Along the Muddy River, Yuma clapper rail habitat is starting to recover from the impacts of the 2005 floods and attempts to control them, which removed much of the rail habitat (Braden et al. 2008). Numbers along the Muddy and Virgin rivers have fluctuated from a high of 26 in 2000 to a low of zero in 2005, after the floods (Braden et al. 2008). In 2006, one pair was detected at Overton WMA in the lower Muddy River floodplain (Braden et al. 2007).

- **Desert Tortoise (Federally Threatened)** – One designated critical habitat unit (Mormon Mesa) occurs within the natural resources region of study in eight hydrologic basins (Las Vegas, Garnet, Hidden, Coyote Spring, Kane Springs, Muddy River Springs, Lower Meadow Valley Wash, and Lower Moapa valleys). Within the region of study, approximately 366,676 acres have been designated as critical habitat for the desert tortoise. In 1998, the Las Vegas Field Office BLM RMP established four ACECs for the protection of critical desert tortoise habitat (BLM 1998). Three additional ACECs were established by the Caliente Amendment for the protection of critical desert tortoise habitat (BLM 2000).

  The desert tortoise inhabits upland plateaus and mountain slopes in the Mojave Desert, from 1,000 to 4,200 feet in elevation. The species requires firm ground with adequate ground moisture for constructing burrows in banks of washes or compacted sand and for digging holes for nests. The active period for desert tortoise is from April to October (USFWS 2009). Tortoise activity decreases in summer (June, July, and August), but they emerge after summer rain storms (USFWS 2008). The NDOW, NNHP, BLM, and USFWS have documented numerous desert tortoise sightings within the region of study. There have been several reports of desert tortoise burrows in the lowlands near the mountains from Ash Springs, southward along Pahranagat Wash to the Lincoln County line. Sites that are occupied by desert tortoise are scattered throughout southeastern Lincoln County, with areas of concentration along Kane Springs Wash, Meadow Valley Wash, and the region just south of the Tule Springs Hills. In addition, desert tortoise habitat in Clark County is widespread at elevations below 4,500 feet. The majority of the known occurrences of desert tortoise are found within the southern portion of the county between the Las Vegas Valley and Laughlin, Nevada (RECON 2000). Additional occurrence records are found near Red Rock Canyon and the Moapa Indian Reservation (RECON 2000). See additional discussion under Section 3.6.1.2, ROW Areas, Special Status Species.

- **Yellow-billed Cuckoo (Federal Candidate)** – The yellow-billed cuckoo formerly ranged throughout much of North America, from southern Canada to northern Mexico (USFWS 2001). However, the bird has suffered population decline (primarily because of the loss of streamside habitat) and is declining west of the Continental Divide (Biota Information System of New Mexico 2002).

  The yellow-billed cuckoo inhabits dense riparian woodlands with tall cottonwood and willow trees. It can also occur in deciduous woodlands, moist thickets, orchards, or overgrown pastures. The yellow-billed cuckoo has been reported in six locations in the Lincoln County portions of the study area. Observations of yellow-billed cuckoo were reported at two sites along Meadow Valley Wash: a breeding pair was identified at one site in 2001 and a single bird was identified at another site in 2002. In total, approximately 253 acres of riparian vegetation were

delineated as marginal habitat for this species in Meadow Valley Wash (BIO-WEST 2005). At Crystal Springs, two breeding pairs were reported in 2001. South of Crystal Springs, individual birds were observed at a fourth site in 2000 and 2002. At another site on private land near Ash Springs, two breeding pairs and five single birds were reported in 2000. At the same private land site in 2001, four mated birds and one unmated bird were noted based on call response. In Clark County, the yellow-billed cuckoo has been detected at one location in Lower Moapa Valley and two sites in the Muddy River Springs Area hydrologic basins. In addition, this species was detected in Utah in the Fish Springs Flat hydrologic basin. The yellow-billed cuckoo has been detected several times in the Pahranagat Valley, and most recently on the NWR on July 7, 2006, in riparian woodland habitat (Johnson et al. 2007) and at the Pahranagat north survey site in 2008 (Braden et al. 2009). The Warm Spring Ranch in Moapa Valley (north of the town of Glendale) is the most consistent location for yellow-billed cuckoo in southern Nevada (Braden et al. 2007). At one time, 7 to 14 breeding pairs occurred there per season, but numbers since 2002 have been lower (Braden et al. 2007; NDOW 2007b). Potentially suitable habitat for the yellow-billed cuckoo in the region of study is limited to riparian and wetland areas (Las Vegas, Pahranagat, Muddy River Springs Area, Lower Moapa, Lower Meadow Valley Wash, and Fish Springs Flat valleys).

- **Greater Sage-Grouse (Federal Candidate)** – There are more than 300 known greater sage-grouse active, inactive, historic and unknown lek sites within the natural resources region of study (**Figure 3.6-7** and the Glossary for an explanation of these four lek classifications). **Figure 3.6-8** shows PPH and PGH. All greater sage-grouse habitat is in the northern portion of the natural resources region of study, beginning in the northern halves of Lincoln County, Nevada and Iron County, Utah. See the habitat discussion under Section 3.6.1.2, ROW Areas, Special Status Species and in **Appendix F**, **Table F3.6-3**.

- **Raptors** – The GBBO has published data from spring-breeding bird surveys that were conducted from 2004-2006 and winter raptor surveys from 2005-2008. Additional data from GBBO and the state Natural Heritage programs were also reviewed. Of the representative special status species (golden and bald eagle, ferruginous hawk, northern goshawk, peregrine falcon, and western burrowing owl), all but the northern goshawk have been recorded in more than half the basins in the natural resources region of study (Floyd et al. 2007; GBBO 2007a,b; NNHP 2006, 2010, 2011; UNHP 2007; Wildland International 2009, 2007; NDOW 2012) see **Appendix F**, **Table F3.6-1**.

  The study area provides an abundance of habitat for species that depend on sagebrush, salt desert scrub, or pinyon juniper habitats. The highest densities of ferruginous hawks in Nevada occur within the study area. Ferruginous hawks are both a Utah and Nevada Partners in Flight priority species. The NDOW has been monitoring ferruginous hawk nests since the 1970s and has documented a decline in the number of active nesting territories over this period (Klinger and Williams 2005). In Utah, ferruginous hawk is considered rare and productivity may not be sufficient to sustain the state's population (Sutter et al. 2005). Nevada and western Utah represent a large portion of the basin and range province, which support 28 percent of the world population of prairie falcons (Nevada Partners in Flight 1999). Prairie falcons nest in cliffs and rock outcrops; other raptors within the study area may use rock outcrops, trees, or burrows as nesting sites. Habitat and life-history information for special status raptors is provided in **Appendix F**, **Table F3.6-3**.

- **Additional Special Status Birds** – The natural resources region of study includes habitat for a wide variety of bird species. Representative species that occur in habitats potentially impacted by the proposed project construction or operation are included in **Appendix F**, **Table F3.6-1** (e.g. common yellowthroat, long-billed curlew, and western snowy plover). This list follows the MOU between the BLM and the USFWS to Promote the Conservation of Migratory Birds. Section 3.5, Vegetation Resources, explains the key groundwater dependent resources potentially impacted by groundwater pumping, namely phreatophytic vegetation and wetland/wet meadow types. See the bulleted lists earlier in this section on cover types and associated special status species.

- **Pygmy Rabbit**– Pygmy rabbits are found in the Great Basin desert ecological region of the study area. While habitat exists further south, records of the species are found in the northern half of Lincoln County, Nevada, in Beaver County, Utah and areas further north. See habitat discussion under Section 3.6.1.2, ROW Areas, and in **Appendix F**, **Table F3.6-3**.

- **Bats** – The majority of the 23 bat species in Nevada and Utah could occur throughout the natural resources region of study (Bradley et al. 2006). Based on records from NNHP (2006) and O'Farrell Biological Consulting (2006),

bat occurrences are listed for the region of study in **Appendix F**, **Tables F3.6-1** and **F3.6-3** which also include life history and habitat information.

Acoustic sampling for bats was conducted at 32 locations in 12 valleys (O'Farrell Biological Consulting 2006). Nine of these basins (Cave, Delamar, Dry Lake, Lake, Pahranagat, Pahroc, Spring, Snake, and White River) are within the region of study. A total of 16 bat species was recorded in the study, with multiple species occurring in 10 valleys within the study area. Mist net surveys were conducted in 2008 (SNWA 2009a) at 11 sites in four valleys within the region of study. These included two additional sites in Spring Valley and one additional site in Steptoe Valley that had not previously been surveyed in the acoustic sampling study. Special status bat species are listed in **Table F3.6-1**. Of the 22 species listed in the table, only 5 (Allen's big-eared bat, California leaf-nosed, cave myotis, greater western mastiff bat, and spotted bat) were not detected during acoustic or mist net surveys. NDOW reports a large Brazilian free-tailed colony that forages in Spring Valley and adjacent valleys.

Most of the species have a broad distribution in Nevada. However, nine species (big free-tailed, California leaf-nosed bat, cave myotis, fringed myotis, greater western mastiff bat, Yuma myotis, silver-haired, hoary, and western red bat) have a limited distribution in Nevada. The big free-tailed and western red bats have limited distribution in Utah, yet the fringed and Yuma myotis are found in much of the state. Most bat species are insectivores; foraging habitat includes areas with supporting insect populations, usually with some association to surface water (e.g., streams, springs, or ponds). Roost sites vary by season and gender, and commonly are close to foraging habitat. Summer roosts are primarily inhabited by females and their young until the young are independent, approximately 1.5 months after birth. Most bats return to their maternal roost each year. During the period of maternal care, males are thought to have widely-spaced, individual roost sites. After the young are independent, both sexes generally disperse across the habitat, using individual roost sites in tree crevices, cavities and cracks in rocks, and crevices in cliffs. In the fall, both males and females begin to congregate at winter roost sites, which allow more protection during the cold periods. Mating occurs during the fall, just before hibernation, and fertilization occurs in the spring when the female ovulates. One, and occasionally more, young are born per female, 2 to 3 months later in the maternal roost (Bogan 2000).

- **Dark Kangaroo Mouse** – Within the natural resources region of study, NDOW has records of the species in Cave, Dry Lake, Hamlin, Lake, Spring, Steptoe, and White River valleys. See **Appendix F**, **Table F3.6-3** for additional information on habitat and life history.

- **Terrestrial Invertebrates** – Species surveys were conducted by Ecological Sciences, Inc. (2007) at 76 locations within or close to the boundary of the study region in Nevada and Utah. The BLM lists a number of terrestrial invertebrates as sensitive species, which are known to occur in the region of study. Nine of these species occur in habitats or at elevations that may be impacted by construction or operation of the proposed project. These species are the Aegilian scarab beetle, White River Valley skipper, White River wood nymph, Baking Powder Flat blue butterfly, MacNeill sooty wing skipper, Mojave poppy and Gypsum bees, and Steptoe Valley crescentspot. Most species are not well known and potential association with wetland or phreatophytic vegetation also is not well understood. However, given their apparent host plants, the White River Valley and McNeil's sootywing skippers may be tied to surface water dependent resources. See **Appendix F**, **Table F3.6-1** for basins of occurrence and **Table F3.6-3** for information on habitat and life history if information was available.

- Other Wildlife Species or Habitats of Interest

  Cave habitats are in karst formations at scattered locations throughout the natural resources region of study (**Figure 3.2-5**) in both Nevada and Utah. In general, cave ecology is unique because nutrients enter the system via water or organisms that in turn deposit debris, guano, or decomposing carcasses. These materials represent the only source of nutrients for organisms that are restricted to life in the cave environment (Baker 2007). Biological surveys that have been conducted in caves within the Baker, Lehman, and Snake creek watersheds in GBNP have shown diverse and unique biological communities (Krejca and Taylor 2003). Model Cave, part of the Baker Creek watershed, has the highest known species diversities of cave invertebrates in Nevada caves (NPS 2005). Based on surveys in eight caves, eight animal phyla were observed, with the most diverse classes being insects, mites, spiders, and scorpions. Some species, such as the Lehman Cave millipede, are restricted to one cave. Caves also contain primitive insect species such as the campodeid dipluran. New or potentially new millipede species also have been described in two of the Baker Creek watershed caves (Shear and Shelley 2007; Shear 2007). Further bioinventory work conducted by Taylor et al. (2008) in 22 caves both in and outside GBNP greatly increased the

information available about species using caves. Two new millipede species have been described and identified, *Idagona lehmanensis* and *Nevadesmus ophimontis* (Shear 2007, Shear et al. 2009), and a new springsnail, *Pygmarrhopalites shoshoneiensis*, has also been found and identified (Zeppelini et al. 2009). Based on work by Taylor et al. (2008), the potentially new millipede species described by Shear (2007) has been recorded in more caves, expanding the range of elevations in which the species has been found. A variety of mammals, such as cliff chipmunk, deer mouse, and bats, also inhabit caves (Baker 2007; NPS 2005; Krejca and Taylor 2003). Both the Ely and Las Vegas RMPs as well as the GBNP General Management Plan recognize the importance of caves and have management objectives to protect and manage caves.

Assessment of four watersheds in GBNP (NPS 2007) included surveys for birds, small mammals, and cave resources. Three NPS sensitive bird species were detected during surveys and habitat for 12 additional NPS sensitive bird species was documented. Small mammal surveys detected 11 species, 1 of which is NPS sensitive. The assessment also described 20 caves. These caves serve as habitat for nine different species of bats (NPS 2007), six of which are NPS sensitive (NPS 2006) and macroinvertebrates (see above). For information on other representative species selected by the Natural Resources Group that are NPS sensitive, see **Appendix F**, **Table F3.6-1**.

Culturally Significant Wildlife Species

As explained in the section overview, wildlife species that have been identified by tribes (Duckwater, Goshute, and Ely Shoshone) as culturally significant include elk, bighorn sheep, antelope, deer, bears, mountain lions, coyotes, wolves, rabbits (pygmy, jack, cottontail), rock chucks, ground squirrels, pack rats, pocket gophers, sage-grouse, mudhen, crickets, and various species of raptors and waterfowl. These animals have the potential to occur throughout historical aboriginal territories and throughout the proposed project area in appropriate habitat. Species likely to be impacted by the proposed project are discussed in Section 3.6.2.

3.6.2 Environmental Consequences

3.6.2.1 Rights-of-way

Issues

The following issues are discussed as part of the impact analysis of construction and facility maintenance.

Construction

- Habitat loss and fragmentation from construction clearing of ROWs, transmission lines, and new and improved access roads.
- Direct disturbance and loss of individuals from construction activities along ROWs (including trenching), transmission lines, and access roads.
- Disturbance and loss of individuals from accidental wildfires and loss of habitat.
- Indirect effects, consisting of displacement of individuals and loss of breeding success, from exposure to construction movements, noise and higher levels of human activity (including traffic).
- Compliance with recovery plans, conservation agreements, and state wildlife action plans for special status species.
- Potential disruption of migration patterns because of temporary fencing and potential entanglement and loss of individuals.
- Potential effects on terrestrial wildlife species that are culturally significant and traditionally used as food by regional Tribes.

Facility Maintenance

- Indirect effects, consisting of displacement of individuals and loss of breeding success because of operational noise and higher levels of human activity (including traffic).
- Direct loss of individuals from traffic mortality.
- Potential effects from collisions and electrocutions to raptors and other wildlife from power lines.
- Potential effects of additional infrastructure resulting in increased perches for raptors and corvids that may increase predation on other animals.
- Compliance with recovery plans, conservation agreements, and state wildlife action plans for special status species.

Assumptions

The following assumptions were used in the ROW impact analysis for terrestrial wildlife:

- Identification of terrestrial wildlife that could be affected by project actions focused categorically on species of management concern and special status wildlife species in the ROWs.
- Construction disturbances, while temporary in nature, have been defined as long-term for all habitat types due to existing vegetation structure and composition, recovery time frames, and limiting revegetation factors (e.g., low precipitation rates, soil chemistry constraints, and soil moisture).
- The mainline pipeline ROW would not be realigned or curved to avoid sensitive wildlife species habitat because of the large diameter of the pipeline. Temporary work space along the construction ROW may be narrowed to avoid sensitive habitats. Access roads and power line pole locations can be adjusted to avoid discrete sensitive species habitat features.

Methodology for Analysis

Construction and surface disturbance impacts by alternative were evaluated using the following steps:

- Calculated the area of habitats in general and the extent of special status species habitats where available, that would be removed temporarily or permanently during project construction or facility maintenance based on various habitat layers including NDOW big game layers, sage-grouse habitat, USGS digital animal-habitat models, and vegetation communities based on SWReGAP cover types.
- Provided additional detail on specific impacts (e.g. greater sage-grouse leks), where more specific data were available for some special status species.
- Evaluated the BLM RMP management actions, BMPs and ACMs available to limit the extent and duration of predicted impacts. Recommended additional mitigation measures to reduce or offset impacts. Described mitigation effectiveness.
- Estimated residual impacts after ACM and RMP management actions and BMPs were applied to each alternative.
- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect wildlife resources from ROW construction and operation activities.

3.6.2.2 Proposed Action, Alternatives A through C

Right-of-way Areas

Construction and Facility Maintenance

Habitat Loss, Fragmentation, Accidental Wildfires, and Power Line Effects

Impacts to terrestrial wildlife resources under the Proposed Action and Alternatives A through C would include surface disturbance or alteration of native habitats, increased habitat fragmentation, animal displacement, changes in species composition, and direct loss of wildlife. The severity of both short- and long-term impacts would depend on factors such as the sensitivity of the affected species, seasonal use patterns, the type and timing of project activities, and physical parameters (e.g., topography, cover, forage, and climate).

Habitat impacts would include both short-term and long-term impacts and permanent reduction or loss of habitat as a result of construction and operation of the proposed project. The Proposed Action would result in the (long-term) loss of 12,303 acres of wildlife habitat, primarily consisting of shrub-scrub types including sagebrush shrubland (48 percent), Mojave mixed desert shrubland (25 percent), and greasewood/saltbush shrubland (24 percent), with lesser amounts of woodland, grasslands, and other types comprising the remaining 3 percent. Approximately 1,000 acres would be permanently converted to industrial uses (**Table 3.5-9**, Vegetation Resources). Habitat loss or alteration would result in direct loss of smaller, less mobile species of wildlife, such as small mammals and reptiles, and the displacement of more mobile species into adjacent habitats. Displacement also could result in some local reductions in wildlife populations, if adjacent habitats are at carrying capacity. The most common wildlife responses to habitat fragmentation are avoidance or accommodation. Avoidance would result in displacement of wildlife from an area that is larger than the actual disturbance area. Although the habitats that are adjacent to the proposed disturbance area could support some displaced animals, species that are at or near carrying capacity could experience a reduction in breeding success and some level of unquantifiable wildlife mortalities. Potential indirect impacts also would include an incremental increase in the potential for wildlife/vehicle collisions (short- and long-term), resulting in an unquantifiable reduction in wildlife populations.

Habitat fragmentation would result from the various project facilities including the development of access roads, pipelines, electrical power lines, and various above-ground facilities including pumping stations and electrical substations. Other fragmentation effects such as increased noise, elevated human presence, dispersal of noxious and invasive weed species, and dust deposition from unpaved road traffic would extend beyond the boundaries of the

project ROWs. These effects would result in overall changes in habitat quality, habitat loss, increased animal displacement, reductions in local wildlife populations, and changes in species composition. The severity of these effects on terrestrial wildlife species depends on factors as listed above.

Habitat fragmentation caused by the construction of access roads can impact habitat in a variety of ways. Roads alter the temperature, humidity, sunlight intensity, moisture content of surrounding soils, and vegetation composition (Vaillancourt 1995). As a result, vegetation adjacent to the roads is dissimilar to surrounding vegetation, as measured by species composition, abundance, dust, and amount of bare soil and litter. Baker and Dillon (2000) summarized the effects on vegetation at a variety of sites and concluded the average depth-of-edge for vegetation effects was 200 feet. Gelbard and Belnap (2003) showed that desert shrub communities located near maintained gravel and paved roads contained a large amount of exotic species, while plant communities near primitive, two-track roads were less disrupted compared to surrounding native vegetation. Based on the literature (Gelbard and Belnap 2003; Baker and Dillon 2000), vegetation community composition would be expected to be altered for approximately 165 to 200 feet away from the roadsides, despite reclamation with native seed mixtures. Additional fragmentation effects are addressed below within the specific species or species group discussions relative to available literature.

Accidental wildfires could be initiated during construction and facility maintenance activities and could cause minor to major impacts on forage and cover availability to all wildlife, depending on the acreage burned and whether any areas of particular species-specific value were disturbed. Impacts from wildfire would result in mortalities of less mobile species (e.g., small mammals, bird eggs and nestlings, reptiles, amphibians, and invertebrates) and short-term or long-term displacement of wildlife from the impacted area. Although the habitats adjacent to the impacted area may support some displaced animals, species that are at or near carrying capacity could result in some unquantifiable mortalities. It is anticipated that wildlife would slowly return to the impacted areas upon revegetation of herbaceous and woody vegetation. ACMs that would reduce potential impacts to wildlife from wildfire during construction would include a fire prevention plan (ACM A.1.1), the presence of a water truck and other fire suppression equipment, the presence of a designated individual at each construction site responsible for fire watch and suppression, an additional fire watch individual during welding activities, and the placement of all flammable materials within a 15-foot brush/litter-cleared area (ACM A.1.47). Proposed mitigation discussed in Section 3.5, Vegetation Resources (ROW-VEG-3) also would help to minimize the potential for accidental wildfire. Impacts related to vegetation composition changes as a result of accidental wildfires are discussed in Section 3.5, Vegetation Resources.

The operation of proposed electrical power lines would increase the potential for electrocution impacts to some bird species (e.g., eagles and other raptors), incrementally increase the collision potential for migrating and foraging bird species (e.g., raptors and migratory birds [APLIC 1994]) and bats, and could serve as predator perches and nest sites, increasing predation potential on a number of species. Potential electrocution impacts would be minimized through the implementation of ACM A.5.66 (see list below). Collision potential typically depends on variables such as the line location in relation to high-use habitat areas (e.g., nesting, foraging, and roosting), line orientation to flight patterns and movement corridors, species composition, visibility, and line design. Potential impacts to birds and bats from an incremental increase in collision and electrocution may be minimized through implementation of the Ely RMP BMP related to new power lines. To reduce the potential impacts of power lines, the applicant has committed to the following environmental-protection measures (for more detail see **Appendix E**):

- Power poles and lines will be designed and constructed in accordance with recommendations of APLIC to reduce the potential to electrocute or otherwise harm raptors (ACM A.5.66);
- Perch discouraging devices will be installed on power lines in sensitive species habitats (ACM A.5.8); and
- Solar panels will be used on monitoring wells to the extent possible to reduce need for additional power lines (ACM B.1.2).

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on terrestrial wildlife resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Conclusion. A total of 12,303 acres of wildlife habitat, primarily consisting of shrub-scrub types including sagebrush shrubland (48 percent), Mojave mixed desert shrubland (25 percent), and greasewood/saltbush shrubland (24 percent), with lesser amounts of woodland, grasslands, and other types comprising the remaining 3 percent would be disturbed (**Table 3.5-9** in Vegetation Resources for estimated vegetation community recovery times). Approximately 1,000 acres would be permanently converted to industrial uses (**Table 3.5-9**, Vegetation Resources). Impacts to terrestrial wildlife from the project include not only habitat loss, but also fragmentation and increased risk of accidental wildfires and increased risk of electrocution impacts to some bird species. Impacts as a result of ROW construction and facility maintenance would be reduced given the protections provided in the RMPs, BMPs, and the ACMs.

Proposed mitigation measures:

ROW-VEG-3: Green Stripping. This measure would assist in reducing impacts to terrestrial wildlife habitat.

Residual impacts include:

- The long-term (20 to 200 years) restoration periods for shrublands and woodlands disturbed by ROW construction make these habitats less suitable for forage and cover and contribute to habitat fragmentation.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.
- Potential terrestrial wildlife mortalities may result from habitat loss, fragmentation, accidental wildfires, or power line electrocutions.

Construction Water Use

SNWA is proposing to use groundwater or temporary construction wells for hydrostatic testing, dust control, pipe bedding, trench backfill compaction, and fire suppression (if needed). Groundwater withdrawal for construction water use could result in localized drawdown effects. There could be potential short-term effects on surface water depending on the hydraulic connection to groundwater and the surface water location. No diversion or modification of surface water flows is anticipated for temporary construction water use. However, any change in water use involving surface water sources would need to meet Nevada permit requirements, as well as a review by the BLM. If surface water use was approved, Ely BMP requirements would apply.

The discharge of hydrostatic test water would follow NPDES requirements, which would eliminate potential effects on water quality. Erosion effects would be minimized by implementing ACMs to reduce discharge velocities (ACM A.1.64 and A.1.65, as described in **Appendix E**). Additional details on hydrostatic test water discharge are provided in Section 3.4, Soil Resources.

Conclusion. Construction water use could adversely affect water sources for wildlife, if surface water is located within the drawdown area and connected to groundwater sources.

Proposed mitigation measures:

As discussed in water resources, mitigation measure ROW-WR-3 (Construction Water Supply Plan) would be required to determine the effects of construction water use on groundwater and surface water. Additional mitigation may be required, if surface water and wildlife habitats are affected.

Residual impacts include:

- Residual effects from construction water use could occur if groundwater withdrawal reduces surface water quantity and water sources for wildlife. Residual effects will be quantified during subsequent BLM review of the Construction Water Supply Plan.

Species of Management Concern

Big Game: Direct impacts to big game species (i.e., pronghorn antelope, Rocky Mountain elk, mule deer, desert bighorn sheep) would include the loss of potential forage within the proposed surface-disturbance areas. Herbaceous forage species might become established within the short-term (Vegetation Resources, **Table 3.5-9**), depending on reclamation success, and future weather conditions in the project region. In most instances, suitable habitat adjacent to the disturbed areas would be available for these species until grasses and woody vegetation were reestablished within the disturbance areas. No impacts to Rocky Mountain bighorn sheep are anticipated from ROW construction or facility maintenance, as this species inhabits higher elevation habitats that would not be impacted by these project activities. Antelope, elk, deer, and bighorn sheep are all considered culturally significant to regional Tribes.

Table 3.6-3 summarizes acreages of pronghorn antelope, Rocky Mountain elk, and mule deer ranges that would be affected by ROW construction (temporary) and facility maintenance (permanent). Impacts include incremental, long-term surface disturbance of approximately 7,952 acres of pronghorn antelope range; 4,019 acres of Rocky Mountain elk range; and 3,917 acres of mule deer range, including 169 acres of mule deer crucial summer range and 133 acres of mule deer crucial winter range. Although surface disturbance activities would represent a long-term habitat loss for big game and the location of the ROW may impact local herds, these disturbance acres would represent a small percentage (less than 1 percent) of the overall available habitat within the basins impacted. Facility maintenance would result in the permanent conversion of mule deer, antelope, and Rocky Mountain elk habitat at the acreages listed in **Table 3.6-3**. During construction, big game species would likely move away from areas being disturbed and may abandon areas of low quality habitat (e.g. areas with low quality forage, invasive weeds, limited water sources, and high human activity). In addition to the habitat impacts, facility maintenance activities could also include long-term, elevated, traffic-caused mortality from the increased vehicle use that would be needed to support maintenance.

Table 3.6-3 Big Game Range Acreage Potentially Impacted by the Proposed Action and Alternatives A through C, Right-of-way Construction (Temporary) and Facility Maintenance (Permanent)

Range	County	Basin	Pronghorn Antelope (Temp.)	Pronghorn Antelope (Perm.)	Rocky Mountain Elk (Temp.)	Rocky Mountain Elk (Perm.)	Mule Deer (Temp.)	Mule Deer (Perm.)
Crucial Summer	Lincoln	Cave	NI	NI	0	0	41	0
		Dry Lake	NI	NI	0	0	4	0
		Lake	NI	NI	0	0	45	5
		LMVW	NI	NI	0	0	11	11
	Lincoln Total		NI	NI	0	0	101	16
	White Pine	Snake	NI	NI	0	0	8	1
		Spring	NI	NI	0	0	42	5
		Steptoe	NI	NI	0	0	18	2
	White Pine Total		NI	NI	0	0	68	8
Crucial Summer Total			**NI**	**NI**	**0**	**0**	**169**	**24**
Crucial Winter	Lincoln	Dry Lake	0	0	NI	NI	3	0
		Hamlin	0	0	NI	NI	130	0
	Lincoln Total		0	0	NI	NI	133	0

Table 3.6-3 Big Game Range Acreage Potentially Impacted by the Proposed Action and Alternatives A through C, Right-of-way Construction (Temporary) and Facility Maintenance (Permanent) (Continued)

Range	County	Basin	Pronghorn Antelope (Temp.)	Pronghorn Antelope (Perm.)	Rocky Mountain Elk (Temp.)	Rocky Mountain Elk (Perm.)	Mule Deer (Temp.)	Mule Deer (Perm.)
Crucial Winter Total			**0**	**0**	**NI**	**NI**	**133**	**0**
Year Round	Lincoln	Cave	668	21	712	21	660	21
		Delamar	757	62	0	0	0	0
		Dry Lake	1,995	184	703	24	1,091	59
		Hamlin	351	2	0	0	0	0
		Lake	566	44	804	57	759	53
		LMVW	0	0	0	0	110	110
		Pahranagat	0	0	0	0	0	0
		Spring	716	80	485	77	328	59
	Lincoln Total		5,053	393	2,704	179	2,948	302
	White Pine	Hamlin	33	0	0	0	0	0
		Snake	879	52	0	0	370	38
		Spring	1,687	113	1,010	83	477	20
		Steptoe	300	16	305	20	122	3
	White Pine Total		2,899	181	1,315	103	969	61
Year Round Total			**7,952**	**574**	**4,019**	**282**	**3,917**	**363**
Total								

NI = None Identified. LMVW = Lower Meadow Valley Wash.

Note: Temporary and permanent acreage numbers in the table may include a minimal acreage of facilities that currently exist. Therefore, the reported acreages conservatively overestimate the amount of disturbance anticipated by the proposed project by approximately 1 percent across all alternatives.

Direct impacts to desert bighorn sheep would include the incremental, long-term reduction of approximately 259 acres of occupied habitat and 25 acres of potential habitat (**Table 3.6-4**), consisting primarily of grassland and desert shrubland habitats. Although surface-disturbance activities would represent an incremental, long-term habitat loss for desert bighorn sheep, these acreages of disturbance would represent less than 1 percent of the overall available habitat for this species on a regional basis. Facility maintenance activities would permanently convert 11 acres of occupied and potential desert bighorn sheep habitat (**Table 3.6-4**). The ROW areas between one of the pressure reducing stations and 2.5 miles north of the regulating tank site cross habitat for desert bighorn sheep. Given the number of facilities in this area, (regulating tank, pressure reducing station, secondary electrical substation, pipeline, and access road) movement between the Delamar Mountains and South Pahroc and Hiko ranges may be reduced. Additionally, proposed ROW locations between the Las Vegas Range and Arrow Canyon Range, Delamar Mountains and Sheep Range, and Egan Range and Schell Creek Range may reduce desert bighorn movements. Locating ROWs and associated facilities within movement corridors would cause habitat fragmentation and displacement of desert bighorn sheep due to increased noise and human presence. Displacement from current migratory routes would be short term in areas where the ROWs would be reclaimed and long term where permanent facilities and roads are located. The increase in habitat fragmentation and displacement of desert bighorn sheep from current migratory routes could cause stress and increased mortality rates to current populations.

Table 3.6-4 Bighorn Sheep Range Acreage Potentially Impacted by the Proposed Action and Alternatives A through C, Right-of-way Construction (Temporary) and Facility Maintenance (Permanent)

County	Basin	Occupied (Temp.)	Occupied (Perm.)	Potential (Temp.)	Potential (Perm.)
Clark	Coyote Spring	11	1	0	0
	Garnet	14	0	0	0
	Hidden	14	1	0	0
	Las Vegas	14	0	0	0
Clark Total		**53**	**2**	**0**	**0**
Lincoln	Cave	0	0	1	0
	Coyote Spring	1	0	0	0
	Delamar	53	5	0	0
	Dry Lake	0	0	0	0
	LMVW	0	0	0	0
	Pahranagat	152	4	0	0
Lincoln Total		**206**	**9**	**1**	**0**
White Pine	Spring	0	0	11	1
	Steptoe	0	0	13	2
White Pine Total		**0**	**0**	**24**	**3**
Grand Total		**259**	**11**	**25**	**3**

LMVW = Lower Meadow Valley Wash.

Note: Temporary and permanent acreage numbers in the table may include a minimal acreage of facilities that currently exist. Therefore the reported acreages conservatively overestimate the amount of disturbance anticipated by the proposed project by approximately 1 percent across all alternatives.

Indirect impacts to all big game species would result from increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from vehicle traffic on unpaved roads during surface-disturbance activities. Given the conservative estimate that adjacent habitats are at or near carrying capacity and due to human development activities in the project region, displacement of big game species would create some unquantifiable reduction in wildlife populations. Displacement of big game, as a result of direct habitat loss and indirect reduction in habitat quality, has been widely documented (Irwin and Peek 1983; Lyon 1983, 1979; Rost and Bailey 1979; Ward 1976). Big game species tend to move away from areas of human activity and roads, reducing habitat utilization near the disturbance areas (Cole et al. 1997; Sawyer et al. 2006). Displacement distances are strongly influenced by the level and timing of human activity, topography, and the presence of vegetation (Cole et al. 1997; Lyon 1979), presumably due to noise attenuation and visual cover. Displacement of big game is greatest for heavily traveled secondary and dirt roads. Most research has focused on displacement distances for elk and deer. Displacement distances indicate the distance from the road's centerline where animal densities are less than in surrounding areas (i.e., under-utilized habitat). In most circumstances, elk were not observed to habituate due to human activities. Deer and pronghorn appear to be more tolerant of human activities than elk. For deer, displacement distances ranged from 330 to 3,168 feet (0.6 mile) depending on the presence of vegetative cover (Ward 1976). Deer and pronghorn have been observed to habituate to vehicles and displacement distances decreased when traffic was predictable, moving at constant speeds, and was not associated with out-of-vehicle activities (Ward 1976). However, traffic within the project area during construction would be characterized by slow-moving traffic, vehicles that stop, and out-of-vehicle activity; thus, acclimation by big game is not anticipated. This displacement would be short term and animals would return to the disturbance area following construction activities (Krausman and Etchberger 1995). In addition, big game may experience increased mortality rates due to increased public access (Cole et al. 1997). Vehicular traffic may injure or kill individuals and local populations may experience higher levels of hunting and poaching pressure due to improved public access (Cole et al. 1997).

The Las Vegas and Ely RMPs include management actions that mitigate loss of priority wildlife habitat, (E:WL-4), seasonally restrict permitted activities (E:WL-6 to 8), protect waters that provide benefit to wildlife (LV:FW-3-e), and ensure authorized activities are consistent with goals and objectives of bighorn sheep management (LV:FW-1-b).

Impacts, as a result of ROW construction and facility maintenance, would be reduced given the protections provided by the RMPs and the ACMs.

In addition to providing a Compliance Inspection Contractor for construction monitoring (ACM A.1.2), the applicant has committed to the following environmental-protection measures to reduce potential impacts to wildlife (for more detail, see **Appendix E**):

- Design to allow seasonal movements across ROWs and access to surface water sources (ACMs A.5.70 and 71);
- Speed-limit restrictions to reduce vehicle/wildlife impacts (ACM A.1.29);
- Escape ramps to be installed at excavation areas that are left open overnight and checked periodically by a biological monitor (ACM A.1.42);
- Assurances that wildlife would not be harassed or intentionally harmed (ACM A.5.5); and
- Where appropriate, restrict permitted activities in big game calving/fawning/lambing grounds and crucial summer range from April 15 through June 30 (ACM A.5.74), in crucial winter range from November 1 through March 31 (ACM A.5.75), and within occupied big horn sheep habitat from March 1 through May 31 and from July 1 through August 31 (ACM A.5.76).

Conclusion. Habitat for big game species would be temporarily disturbed by construction and a portion would be permanently converted to industrial uses as identified in **Tables 3.6-3** and **3.6-4**. There would be a loss of 24 acres of mule deer crucial summer habitat and 11 acres of desert bighorn sheep occupied habitat. Construction and facility maintenance impacts would include displacement of individuals and potential loss of breeding success from habitat alteration, exposure to construction/maintenance movements and noise, and higher levels of human activity (including traffic). The area of habitat affected by construction surface disturbance would represent less than 1 percent of the surface area of these habitat ranges within the hydrologic basins occupied by the GWD Project; however, the location of ROW construction or maintenance activities could impact local herds and migration corridors. Impacts as a result of ROW construction and facility maintenance would be reduced given the protections provided by the RMPs and the ACMs.

Proposed mitigation measures:

In order to address the permanent conversion of 24 acres of mule deer crucial summer habitat and 11 acres of desert bighorn sheep occupied habitat, as well as the long-term surface disturbance to mule deer crucial summer habitat (169 acres), mule deer crucial winter habitat (133 acres), and desert bighorn sheep occupied habitat (259 acres), mitigation measure ROW-WL-1 is proposed.

ROW-WL-1: Big Game Key Habitat Priority Restoration and Habitat Improvement. If surface disturbing activities impact key big game habitats (crucial summer and winter ranges for antelope, Rocky Mountain elk, or mule deer, or occupied desert bighorn sheep habitat), the SNWA would improve 2 acres of comparable habitat for every 1 acre of disturbed habitat. The SNWA would coordinate with the BLM and NDOW to determine the specific areas for big game key habitat improvements. Effectiveness: This measure would be effective in that it would improve habitat thus increasing the carrying capacity of the comparable big game habitat. Effects on other resources: Conducting habitat improvement work for big game may contribute to noise and human presence disturbance to wildlife, as well as the potential for vehicle collisions to wildlife.

Residual impacts include:

- The long-term (20 to 200 years) restoration periods for shrublands and woodlands in big game ranges disturbed by ROW construction make these habitats less suitable for forage and cover and contribute to habitat fragmentation.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.
- Potential big game mortalities may result from vehicle collisions.

Other Terrestrial Wildlife Species of Management Concern: Direct impacts to small mammals, reptiles, game and other bird species of management concern (including raptors) from surface-disturbance activities include the incremental, long-term surface disturbance of 12,208 acres of native shrubland and woodland habitat and would require 20 to more than 200 years for recovery to similar species composition and vertical structure as adjacent undisturbed areas. Sixty-four acres of annual and perennial grassland and marshland habitats would require from 2 to 20 years for recovery. See **Table 3.5-9** in Vegetation Resources for estimated vegetation community recovery times. Natural land habitat types that would be permanently converted to industrial uses would be 1,014 acres. Culturally significant species to regional Tribes in this group of wildlife include rabbits and various species of raptors. Potential impacts also would likely include mortalities of less mobile or burrowing species as a result of crushing from increased vehicle traffic and construction equipment and abandonment or loss of eggs or young. The project will not have any open water storage devices; water troughs proposed in ACMs A.5.72 and A.5.73 for wild horses and big game (**Appendix E**) will include escape ramps approved by the BLM so potential for small wildlife species entrapment and drowning would be minimized.

Indirect impacts include increased habitat fragmentation effects as a result of increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from increased traffic on unpaved roads during surface-disturbance activities. Fragmentation effects would be incremental, but species that require large tracts of unbroken habitat such as sagebrush obligate species may not be able to complete their life functions and this project may contribute to general population declines. General habitat fragmentation, accidental wildfire, and power line impacts are described at the beginning of the ROW areas section; other species-group fragmentation effects are described below.

If construction or facility maintenance were to occur during the breeding season for migratory bird species (approximately March to August, depending on the species, elevation, and location), then direct impacts to MBTA breeding birds could include abandonment of a new site or territory or the loss of eggs or young, resulting in a loss of productivity for the breeding season. Loss of an active nest site, incubating adults, eggs or young would violate the MBTA and potentially could affect populations of migratory bird species that occur within the project area. Management concern raptor species have also been documented in the basins crossed by the ROW (**Appendix F, Table F3.6-1**).

Fragmentation effects on upland game birds have been shown to impact populations adversely. Vehicular traffic may injure or kill individuals and local populations may experience higher levels of hunting and poaching pressure due to improved public access (Holbrook and Vaughan 1985).

For raptor species, fragmentation effects can result in the loss or alteration of habitat, reduction in prey base, and increased human disturbance. The loss of native habitat to human development has resulted in declines of hawks and eagles throughout the West (Boeker and Ray 1971; Schmutz 1984). In some cases, habitat changes have not reduced numbers of raptors but have resulted in shifts in species composition (Harlow and Bloom 1987). Impacts to small mammal populations due to habitat loss and fragmentation can result in a reduced prey base for raptors and lower raptor densities. Furthermore, the increased number of access roads associated with the GWD Project would lead to greater public access. As a result, raptors may be disturbed from nests and roosts, thereby leading to displacement and reduced nesting success (Holmes et al. 1993; Postovit and Postovit 1987; Stalmaster and Newman 1978). Noise levels and human activity also can preclude otherwise acceptable raptor habitat from use (Romin and Muck 2002). As with big game, vehicles that stop cause greater levels of disturbance to raptors than continuously moving vehicles (Holmes et al. 1993; White and Thurow 1985).

Elevated noise levels also contribute to fragmentation effects. In studies that examined the effects of high levels of daily traffic on bird densities located near paved roads, reductions in bird population densities from roads in both open grasslands and woodlands were attributed to a reduction in habitat quality produced by elevated noise levels (Reijnen et al. 1997, 1995). Although visual stimuli in open landscapes may add to density effects at relatively short distances, the effects of noise appear to be the most critical factor, since breeding birds of open grasslands (threshold noise range of 43 to 60 decibels on the A-weighted scale) and woodlands (threshold noise range of 36 to 58 decibels on the A-weighted scale) respond very similarly to disturbance by traffic volume (Reijnen et al. 1997). Reijnen et al. (1996) determined a threshold effect for bird species to be 47 decibels on the A-weighted scale, while a New Mexico study in a pinyon-juniper community found that effects of gas well compressor noise on bird populations were strongest in areas where noise levels were greater than 50 decibels on the A-weighted scale. However, moderate noise levels (40 to

50 decibels on the A-weighted scale) also showed some effect on bird densities in this study (LaGory et al. 2001). The applicant has provided information to the BLM that noise levels from stationary sources (pumping stations and pressure reducing stations), would not exceed 52 decibels on the A-weighted scale at 500 feet from these facilities.

The Ely RMP includes a BMP to install wildlife escape ramps in all watering troughs. In addition, a BMP would use current science, guidelines, and methodologies for all new power lines for the purpose of minimizing raptor and other bird electrocution and collision effects. The procedure for MBTA bird species consultation mentioned in ACM A.5.65 should include consultation with USFWS. Further, the Ely RMP management action (SS-4) and ACMs A.5.62 through A.5.69 provide protections for raptors.

In addition to providing a Compliance Inspection Contractor for construction monitoring (ACM A.1.2), the use of predictive models to identify critical nesting locations (ACM A.5.62), pre-construction and other surveys (ACMs A.5.64, 67, 68), compliance reporting (ACMs A.5.4, A.5.7), and raptor nest monitoring by qualified biologists (ACMs A.5.64 and 68), the applicant has committed to the following ACMs to reduce potential impacts to small mammal, game, and MBTA and other birds species of management concern (for more detail, see **Appendix E**):

- Develop a Construction Traffic Management plan, including measures to reduce the number of trips (ACM A.1.28);
- Develop a bird conservation strategy, including measures to reduce impacts to migratory birds, bald and golden eagles, and other sensitive birds (A.1.1);
- Impose speed-limit restrictions to reduce vehicle/wildlife impacts (ACM A.1.29);
- Install escape ramps in excavation areas, where these areas will be left open overnight; biological monitors will also check these areas periodically (ACM A.1.42);
- Provide assurances that wildlife would not be harassed or intentionally harmed (ACM A.5.5);
- Perch discouraging devices will be installed on power lines in sensitive species habitats (ACM A.5.8); and conduct initial ground clearing outside the critical nesting period for migratory birds as feasible (ACM A.5.63);
- Identify and use exclusion areas as feasible until birds have fledged or consultation with the BLM (ACM A.5.65);
- Conduct pre-construction tree removal (if during breeding season, pre-removal surveys will be conducted; if occupied, tree removal will wait until fledging and any necessary permits are obtained) (ACM A.5.68); and
- Include escape ramps for small wildlife in temporary water haul designs (ACM A.5.72).

Conclusion. 12,208 acres of native shrubland and woodland habitat would be removed or disturbed by construction and would require 20 to more than 200 years for recovery to similar species composition and vertical structure as adjacent undisturbed areas. Sixty-four acres of annual and perennial grassland and marshland habitats would require from 2 to 15 years for recovery. See **Table 3.5-9** in Vegetation Resources for estimated vegetation community recovery times. Natural land habitat types would have 1,014 acres permanently converted to industrial uses. Increased mortalities could occur given construction and facility maintenance activities and timing of activities could impact migratory bird and other species breeding. Fragmentation effects would incrementally contribute to species impacts. Impacts as a result of ROW construction and facility maintenance would be reduced given the protections provided in the RMPs and the ACMs.

Proposed mitigation measures:

ROW-WL-2: USFWS Concurrence on Plans. The SNWA would obtain concurrence from USFWS on any plans developed as part of the POD (ACM A.1.1) that address species protected under the MBTA or the BGEPA. Effectiveness: This measure would be effective in reducing impacts to nesting and breeding MBTA birds and eagles. Effects on other resources: Implementation of this measure would not adversely affect other environmental resources.

ROW-WL-3: Raptor Nest Survey and Avoidance. If surface disturbance activities may be initiated during raptor breeding and nesting seasons (as determined by the NDOW and the BLM), surveys for active raptor nests would be conducted by SNWA within suitable habitat, within 2 weeks prior to the anticipated start of surface disturbing

construction activities. Raptor nests found during surveys would be addressed under the Ely RMP SS-4 management action, as well as protected under provisions of the MBTA and BGEPA as relevant. (SS-4: Where appropriate, restrict permitted activities from May 1 through July 15 within 0.5 mile of raptor nest sites unless the nest site has been determined to be inactive for at least the previous 5 years.) Effectiveness: This measure would be effective in avoiding impacts to nesting raptors. Effects on other resources: Conducting surveys would contribute to noise and human presence disturbance to wildlife, as well as the potential for vehicle collisions to wildlife. This measure also could provide a record of other breeding bird species that could be potentially affected by the project.

Residual impacts include:

- The long-term (20 to 200 years) restoration periods for 12,208 acres of shrubland and woodland habitats disturbed by ROW construction would make these habitats unavailable for nesting, forage, and cover for other management concern species and contribute to habitat fragmentation.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.

Special Status Species

The impact analysis for special status terrestrial wildlife species focuses on those species that were identified as occurring or potentially occurring within the ROWs and project facility areas (**Appendix F**, **Table F3.6-1**). Species for which there is a record of occurrence in the proposed project ROWs and that could be affected by the Proposed Action and Alternatives A through C are presented in **Table 3.6-5**. Alternatives D, E, and F are a subset of these alignments and species with these ROWs would be the same or fewer. As a result, 1 federally listed species and 17 BLM Sensitive Species are analyzed in detail for construction and facility maintenance. Direct habitat impacts during construction (temporary) are presented in the first column, while facility maintenance (permanent) is presented in the second column. Impacts to special status species as a result of fragmentation, accidental wildfires and power lines are the same as generally described in the Habitat Loss, Fragmentation, Accidental Wildfires, and Power Line and Direct Disturbance Effects section. Species or groups of species are addressed in more detail in **Table 3.6-5**.

Desert Tortoise (Federally Threatened). Direct impacts to the desert tortoise would include the incremental, long-term reduction of 2,350 acres of desert tortoise habitat from construction of ROWs and project facilities (1,759 acres of designated critical habitat and approximately 591 acres of non-critical habitat) until reclamation activities are completed and native vegetation is reestablished. This temporary habitat loss would occur over an area in five hydrologic basins (Las Vegas, Garnett, Hidden, Coyote Spring, and Pahranagat valleys). The area of habitat affected by construction surface disturbance would represent approximately 1 percent of critical habitat and less than 0.1 percent of non-critical habitat within these basins. Facility maintenance would include permanent conversion of approximately 245 acres of critical habitat and 86 acres of non-critical habitat. Potential impacts also could result in the direct mortalities of individual tortoises, loss of burrows, and loss of eggs, as a result of crushing from increased vehicle traffic and construction equipment and potential proposed blasting. See Chapter 2 regarding SNWA's ACMs, including a blasting plan. Construction and facility maintenance activities could result in an increased risk of accidental wildfire. If fire occurred within tortoise habitat, it could alter habitat structure and vegetation available as food plants and individual tortoises could be lost. Also see the general discussion of accidental wildfire at the beginning of the ROW construction section.

Indirect impacts include increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic during surface-disturbance activities. This habitat change could cause a variety of impacts involving: barriers to movement, degradation of habitat, increased potential for mortality (e.g., stress-related mortalities may result due to disturbance), or illegal collection. Impacts from the operation of new power lines would include increased predation given the creation of additional perching sites for predators within tortoise habitat. Corvids (e.g., ravens and crows) also use power line structures for nest building, thereby increasing the population of these species (BLM 2001) and the potential for increased predation pressure on tortoises.

The Las Vegas and Ely RMPs include a requirement to manage desert tortoise habitat to achieve recovery criteria and ultimately to achieve delisting of the species. Desert tortoise management actions are described in the Las Vegas and Ely RMPs.

Table 3.6-5 Special Status Species Habitat Acreage Potentially Impacted by the Proposed Action and Alternatives A through C, Right-of-way Construction (Temporary) and Facility Maintenance (Permanent)

Common Name	Habitat (acres) (Temporary)	Habitat (acres) (Permanent)	Habitats
Federally listed species			
Desert tortoise	2,350 (1,759 critical/ 591 non-critical)	331 (245 critical/ 86 non-critical)	Shrubland, Mojave scrub
BLM Sensitive Species			
Mammals			
Pygmy rabbit[1]	3,634	235	Sagebrush shrubland
Bat species[2]	1,166 to 12,030	104 to 1,009	Various habitats potential foraging areas depending on species
Dark kangaroo mouse[1]	7,732	557	Shrubland
Birds			
Greater sage-grouse[3]	2,450/2,497	134/153	Preliminary priority habitat and preliminary general habitat
Golden eagles[1]	12,061	888	Most habitats, potential foraging areas
Bald eagle[1]	5,571	442	Most habitats, potential foraging areas
Ferruginous hawk[1]	5,173	331	Grassland, shrubland, woodland
Western burrowing owl[1]	11,621	858	Grassland, shrubland, marshland
Reptiles			
Gila Monster[1]	2,627	248	Mojave scrub, woodland
Invertebrates			
Mojave poppy bee	1,718	120	Mojave scrub in Coyote Spring Valley

[1] Acreages for these species are based on SWReGAP animal habitat models (USGS 2007).

[2] Bat species recorded in the ROW are listed in **Appendix F**, **Table F3.6-1** and include Big brown bat, Brazilian free-tailed bat, California myotis, fringed myotis, hoary bat, long-eared myotis, long-legged myotis, pallid bat, western pipistrelle, and western small-footed myotis. Acreage range in the table is given for the species with the least and most habitat potentially impacted by construction and facility maintenance (based on SWReGAP animal habitat model data), which are the long-eared myotis and western pipistrelle.

[3] Sage-grouse habitat data are from BLM 2012b.

Note: Temporary and permanent acreage numbers in the table may include a minimal acreage of facilities that currently exist. Therefore, the reported acreages conservatively overestimate the amount of disturbance anticipated by the proposed project by approximately 1 percent across all alternatives.

In addition to construction monitoring (ACM A.5.30), adherence to USFWS-approved desert tortoise survey protocols (ACMs A.5.17-20, 30), and acquisition of appropriate state and federal permits or letters of authorization prior to handling desert tortoises and their parts (ACM A.5.16), and development of a blasting plan (ACM A.1.1), the applicant has committed to the following ACMs to reduce potential impacts to desert tortoise (for more detail, see **Appendix E**):

- Excavation, handling and procedures for moving individuals out of harm's way (ACMs A.5.16-17, 21-27, A.5.34);
- Placement of exclusion fencing (ACM A.5.18);
- Speed-limit restrictions to reduce vehicle/wildlife impacts (ACM A.1.29);
- Escape ramps to be installed at excavation areas that are left open overnight and checked periodically by a biological monitor (ACM A.1.42);
- Assurances that wildlife would not be harassed or intentionally harmed (ACM A.5.5);
- Hydrostatic water discharge plans (ACM A.1.64);
- Installation of perch discouraging devices (ACM A.5.8); and

- Reporting of acres disturbed, remuneration fees paid, and number of tortoises taken during the project activities (ACM A.5.36).

Conclusion. Compliance with the ESA would require implementation of measures to reduce the effects of anticipated take of desert tortoise, including through habitat loss or degradation. The USACE has designated the BLM as the lead federal agency to act on their behalf for the purposes of section 7 of the ESA (see Chapter 1). Potential impacts would be reduced based on compliance with recovery plans and RMPs and adherence to ACMs.

Proposed mitigation measures:

The applicant would coordinate with the USFWS on this species. No additional mitigation beyond what would be determined by USFWS would be proposed.

Residual impacts include:

- The long-term (100 to 200 years) restoration period for Mojave mixed desert scrub in areas disturbed by ROW construction makes this habitat unavailable for nesting, forage, and cover for tortoise and contributes to habitat fragmentation.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.
- Potential mortalities to tortoises may occur due to construction activities.

Greater Sage-grouse (Federal Candidate). Direct impacts of construction to this species would include the incremental long-term loss of PPH and PGH in the valleys listed in **Table 3.6-6**. Facility maintenance would result in the permanent loss of PPH and PGH shown in **Table 3.6-6**. With over 500,000 acres of PGH and over 900,000 acres of PPH in the seven basins crossed by the ROW, the area of habitat affected by construction surface disturbance would represent less than 1 percent of the surface area of these habitat types in the basins. As explained in the Affected Environment section, 31 leks were identified within 4 miles of the proposed ROWs (**Table 3.6-7**). Of the 31 leks identified, 19 are considered active; however, no known active lek sites occur within 0.25 mile of the proposed disturbance areas for the project. Other direct impacts could include the loss of nests, eggs, or young. These 19 active leks also are within 4 miles of proposed overhead power line ROWs.

Table 3.6-6 Summary of Greater Sage-grouse Preliminary Priority and Preliminary General Habitat Acreages Potentially Impacted by Proposed Action and Alternatives A through C, Construction (Temporary) and Facility Maintenance (Permanent)

Basin	Preliminary Priority Habitat (Temp.)	Preliminary Priority Habitat (Perm.)	Preliminary General Habitat (Temp.)	Preliminary General Habitat (Perm.)
Cave	699	21	0	0
Dry Lake	0	0	694	28
Hamlin	0	0	178	0
Lake	263	22	142	10
Snake	0	0	558	27
Spring	1,236	77	855	83
Steptoe	251	14	51	3
Total	**2,450**	**134**	**2,497**	**153**

Table 3.6-7 Summary of Greater Sage-grouse Active, Inactive, and Historic Lek Locations within 4 Miles of the Proposed Action and Alternatives A through C, Right-of-way (Temporary)

Basin	Population Management Unit	Active	Inactive	Historic	Unknown	Total # of Leks
Cave Valley	Cave	5	0	0	0	5
Lake Valley North	Lincoln	2	2	0	0	4
Hamlin Valley	Spring/Snake Valley	0	0	1	0	1
Snake Valley	Spring/Snake Valley	1	0	3	0	4
Spring Valley - White Pine, Lincoln	Spring/Snake Valley	4	0	0	1	5
Spring Valley - White Pine, Lincoln	Lincoln	2	2	0	0	4
Steptoe Valley	Butte/Buck/White Pine	0	0	0	1	1
Steptoe Valley	Steptoe/Cave	4	0	1	1	6
Steptoe Valley	Sehell/Antelope	1	0	0	0	1
Total		**19**	**4**	**5**	**3**	**31**

Indirect impacts include increased habitat fragmentation effects as a result of increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic during surface disturbance activities. Nest or lek abandonment could result from increased human noise and presence close to an active nest or lek site. Additional potential impacts from power lines and roads include disruption of seasonal movements, increased collision potential as well as increased predation or harassment by raptors, corvids, and coyotes. Sage-grouse may also avoid habitat near utility lines as a result of the perceived threat of predation (Atamian et al. 2007).

There are 19 active leks (5 in Cave Valley, 1 in Snake Valley, 5 in Steptoe Valley, 1 in Lake Valley, and 7 in Spring Valley) located within 4 miles of proposed overhead power lines. The alignment of the proposed power line ROW falls within the designated LCCRDA corridor as it passes near the majority of these leks. Seven of the 19 leks are impacted by power line alignments that fall outside designated corridors: 2 in Spring Valley in line-of-sight of the 25 kV power line, 1 in Snake Valley outside of line-of-sight of the 25 kV power line, and 4 in Steptoe Valley in line-of-sight of the 230 kV power line. Impacts to leks near power lines vary given a number of factors related to line-of-sight including: distance between the power line and the lek; cardinal direction (east/west) of the power line from the lek; background of the view; and topography (BLM 2001). Leks most at risk for increased avian predation would be a short distance west of a power line that is on flat ground or on ground with a slope that faces toward the power line, and a mountain range or some other backdrop to obscure the outline of a perched predator (BLM 2001). Other leks near power lines also may experience impacts from predators depending on the combination of these orientation factors.

Additionally, **Table 3.6-8** lists the acreages of PPH and PGH within 4 miles of proposed power line ROWs. While Dry Lake Valley does not have lek sites, there is PPH and PGH within 4 miles of power line ROW. The percent of PPH potentially indirectly impacted by the proposed power line ROWs is shown in **Table 3.6-8**. Sage-grouse may abandon certain areas within and near the proposed project due to loss or alteration of habitat as a result of construction or facility maintenance activities. Sage-grouse are considered culturally significant to regional Tribes.

Table 3.6-8 Summary of Greater Sage-grouse PPH and PGH Acreages Potentially Indirectly Impacted by Proposed Action and Alternatives A through C, within 4 miles of Power Line ROWs

Basin	Greater Sage-grouse PPH within 4 Miles of Power Line ROW (Acres)	Greater Sage-grouse PGH within 4 Miles of Power Line ROW (Acres)	Total Greater Sage-grouse PPH within the Valley	Percent of Total Greater Sage-grouse PPH within the valley that falls within 4 Mile of Power Line ROW (%)
Cave	42,689	3,863	86,900	49
Dry Lake	85	79,108	194	44
Hamlin	0	8,187	69,125	0
Lake	23,258	29,767	34,699	67
Pahroc	4,880	0	7,448	66
Snake	5,382	25,778	24,681	22
Spring (SLD)	104,207	48,915	291,889	36
Steptoe	62,357	28,659	408,851	15
White River	39	0	105,984	Less than 1
Total	**242,897**	**224,277**	**1,029,771**	**24**

SLD: Salt Lake Desert (flow system) as opposed to Spring [201].

In addition to providing a Compliance Inspection Contractor for construction monitoring (ACM A.1.2) and the development of a greater sage-grouse monitoring program in priority habitat that addresses demographics, vital rates, and seasonal movement patterns, as recommended by the NGSCT (2010) (ACM A.5.50), the applicant has committed to the following ACMs to reduce potential impacts to greater sage-grouse (for more detail, see **Appendix E**):

- Site facilities as much as possible to limit disturbance in priority sage grouse habitat, be within designated utility corridors, and be co-located along existing ROWs including power lines and roads, per the National Greater Sage-Grouse Conservation Measures report (BLM 2011b) (ACM A.5.49);
- Design and operation of lighting to reduce visual impacts (ACMs A.11.2 and A.11.3), which also would benefit greater sage-grouse;
- No spraying of herbicides within exclusion areas containing sensitive resources (ACM A.1.89);
- Construction scheduling restrictions (ACMs A.5.51);
- Site and design electrical transmission lines in accordance with the NGSCT (2010), where placement of power lines within 3 miles of an active lek cannot be avoided. (ACM A.5.52);
- Enhanced restoration measures (ACM A.5.53);
- Installation of perch discouraging devices (ACM A.5.8); and
- Habitat enhancement (ACMs A.5.54, A.5.55, A.5.56).

The applicant also is working on development of a Candidate Conservation Agreement with Assurances to provide benefit to specific species (including greater sage-grouse and pygmy rabbit) that occur on SNWA private properties in Spring Valley and associated grazing allotments. ACMs would reduce impacts to sage-grouse from the construction and maintenance of project facilities. ACM A.5.51 limits activities within 4 miles of active leks during breeding, nesting and early brood-rearing periods (generally March through June). This ACM addresses many potential impacts during this critical season and location for sage-grouse, but the timeframe and language of this ACM is not restrictive enough. Further, ACM A.5.8 will reduce potential impacts from predators, but perch deterrents are not completely effective, nor do they address the potential issue of habitat abandonment. Finally, ACM A.5.50 addresses monitoring of sage-grouse in priority habitat in the project area, but the monitoring should be further clarified and the area should be expanded.

IM 2012-043 states that the policies and procedures outlined in the IM are in addition to and do not replace more protective measures in existing land use plans. SNWA, in their original ACMs, included management actions from the Ely RMP that were applicable to greater sage-grouse. Given the evolving nature of the greater sage-grouse policies, SNWA updated their measures to reflect their understanding of what is required under the IM. BLM, in coordination with NDOW, will implement the intent of IM 2012-043 as well as work to amend their RMP in accordance with IM 2012-044. In the intervening time, management actions in the RMP and direction in the IM will be applied to this project; where the two documents conflict, the IM will take precedence.

Ely RMP management actions SS-40 and SS-42 are considered as included for the purposes of this analysis. SS-40 restricts the construction of above-ground facilities within 0.25 mile of a lek outside of designated corridors and underground facilities will not be installed within 0.25 mile of a lek unless the vegetation can be established to pre-disturbance conditions within a reasonable period of time. It also states that no new roads will be constructed within 0.25 mile of leks. Exceptions may be granted by the authorized officer. SS-42 restricts permitted activities from November 1 through March 31within greater sage-grouse winter range, where appropriate.

Conclusion. Habitat for greater sage-grouse would be temporarily disturbed by construction and a portion would be permanently converted to industrial uses as identified in **Tables 3.6-6** through **3.6-8**. Nineteen active leks fall within 4 miles of project ROWs. Construction and facility maintenance impacts could include loss of nests, eggs, or young, nest or lek abandonment, and increased potential for disruption of seasonal movements, collisions with power lines and vehicles, and predation or harassment. RMP management actions and ACMs would reduce potential impacts to greater sage-grouse.

Proposed mitigation measures:

While ACM A.5.8 would reduce potential impacts from predators, perch deterrents are not completely effective, nor would they address the potential issue of habitat abandonment. Given the importance of avoiding impacts to leks where practicable, mitigation measure ROW-WL-4 is proposed. Other ACMs, as listed above, would potentially reduce impacts to greater sage-grouse from the construction and maintenance of project facilities. In addition, mitigation measures ROW-WL-5, ROW-WL-6, ROW-WL-7, ROW-WL-9, and ROW-WL-10 are proposed. ACM A.5.50 would implement a monitoring plan; ROW-WL-8 further clarifies that monitoring plan.

ROW-WL-4: **Specific Lek Avoidance – Burying Power Lines**. For the power line in Cave Valley, the SNWA would bury the portion of the 25-kV line within the 4-mile buffer of the active leks in Cave Valley. For the power line in Snake Valley, the portion of the 25-kV line within the 4-mile buffer of the active lek would be buried. If technology at the time of construction allows, lines greater than 25-kV would also be buried. Effectiveness: This measure would be effective in avoiding power line associated impacts to these specific leks. Effects on other resources: Burying these power line segments would result in additional surface disturbance and could affect various other resources. These proposed segments are adjacent to the proposed pipeline ROW, so impacts are likely to be similar to those along the pipeline. This measure would potentially reduce impacts to visual resources in these portions of Cave and Snake valleys.

ROW-WL-5: **Specific Lek Avoidance –Siting of Power Lines**. Outside the LCCRDA corridor, the SNWA would site 230-kV power lines west of active leks at sufficient distances to avoid line-of-sight with leks. Effectiveness: This measure would be effective in avoiding increased predation of leks due to additional perching sites for raptors and corvids as well as minimizing potential lek abandonment. Effects on other resources: Locations selected to avoid active sage-grouse leks will be evaluated by the BLM for management consistency with other resource values.

ROW-WL-6: **Habitat Restoration to Benefit Greater Sage-grouse for Permanently Converted Habitat**. Restore greater sage-grouse habitat on public lands at a ratio of 2 acres for every acre of PPH or PGH (or designated priority or general habitat) that is permanently converted. The SNWA would coordinate with the BLM and the NDOW to determine the specific areas and timing for restoration activities. Effectiveness: This measure would be effective in mitigating permanent impacts to sagebrush habitat to benefit greater sage-grouse depending on the type, timing, and location of restoration activities. Effects on other resources: Conducting restoration activities would contribute to noise and human presence disturbance to wildlife as well as the potential for vehicle collisions to wildlife. This measure may also benefit other sagebrush obligate species like the pygmy rabbit.

ROW-WL-7: **Habitat Restoration to Benefit Greater Sage-grouse for Other Disturbed Habitat**. Restore greater sage-grouse habitat on public lands for PPH and PGH (or designated priority or general habitat) that is avoided because of temporary habitat loss due to construction and presence of above ground structures. The SNWA would coordinate with the BLM and the NDOW to determine the specific areas, acres, and timing for restoration activities. Effectiveness: This measure would be effective in mitigating impact to sagebrush habitat to benefit greater sage-grouse depending on the type, timing, and location of restoration activities. Effects on other resources: Conducting restoration activities would contribute to noise and human presence disturbance to wildlife as well as the potential for vehicle collisions to wildlife. This measure may also benefit other sagebrush obligate species like the pygmy rabbit.

ROW-WL-8: Greater Sage-grouse Monitoring. In consultation with BLM, NDOW, and USFWS, SNWA would implement a monitoring program before, during, and after the construction phase for greater sage-grouse in the project area that addresses demographics, vital rates, and seasonal movement patterns, as recommended by the Nevada Energy and Infrastructure Standards to Conserve Greater Sage-Grouse (NGSCT 2010) or the most recent standards document approved prior to the start of the monitoring effort. The project area that is relevant to greater sage-grouse would be determined based on best available science at the time of the start of the monitoring effort. Currently, it would include birds using leks within 4 miles of the project area. Effectiveness: This measure would be effective in providing additional baseline information as well as information on birds using the project area. Effects on other resources: Conducting surveys would contribute to noise and human presence disturbance to wildlife, as well as the potential for vehicle collisions to wildlife.

ROW-WL-9: Greater Sage-grouse Timing Restriction Breeding, Nesting, and Early Brood-Rearing. Restrict permitted activities within 4 miles of active greater sage-grouse leks during the breeding, nesting, and early brood-rearing periods (generally March 1 through July 31). Effectiveness: This measure would be effective in avoiding activities during a key time frame for greater-sage grouse. Effects on other resources: Restricting activities during one time period can move work to occur during other seasons, which may impact important activities for other wildlife species or resources.

ROW-WL-10: Greater Sage-grouse Timing Restriction Winter Range. Restrict permitted activities from November 1 through March 31 within greater sage-grouse winter range. Effectiveness: This measure would be effective in avoiding activities during a key time frame for greater-sage grouse. Effects on other resources: Restricting activities during one time period can move work to occur during other seasons, which may impact important activities for other wildlife species or resources.

ROW-WL-11: Fence Marking for Greater Sage-grouse. Fencing used by the project in greater sage-grouse habitat would be adequately marked following accepted methods and approved by BLM prior to installation. Effectiveness: This measure would be effective in minimizing the potential for greater sage-grouse collisions with project fences. Effects on other resources: Marked fences also will be visible to other wildlife and people. Visual resources would be negatively impacted by marked fences.

ROW-WL-12: Co-location of Power Lines. Co-locate proposed utility lines where technically feasible. Effectiveness: This measure would be effective in reducing the amount of infrastructure associated with multiple utility lines, thus reducing potential perching sites and reducing the amount of above ground structures that may cause greater sage-grouse to avoid habitat. Effects on other resources: Minimizing the amount of above-ground infrastructure also may reduce impacts on other resources depending on the selected route for collocation.

Residual impacts include:

- The long-term (20 to 50 years) restoration periods for sagebrush shrubland habitats disturbed by ROW construction make these habitats less suitable for forage and cover for greater sage-grouse.
- An unknown portion of habitats may be degraded because recovery did not fully occur or proximity to permanent facilities makes the habitat less suitable.
- Nine leks within 4 miles of the ROW sited within the LCCRDA corridor may be attended by fewer males or abandoned given the proximity of the overhead power lines.

Raptors: Direct impacts to these species would include the long-term reduction of approximately 12,061 acres of golden eagle habitat in 13 valleys (Cave, Coyote Spring, Delamar, Dry Lake, Garnet, Hamlin, Hidden, Lake, Las Vegas, Pahranagat, Snake, Spring, and Steptoe valleys), and 5,173 acres of ferruginous hawk nesting or foraging habitat in 10 valleys (Cave, Coyote Spring, Delamar, Dry Lake, Hamlin, Lake, Pahranagat, Snake, Spring, and Steptoe valleys). Since bald eagles do not nest in the project area, direct impacts would include the long-term reduction of approximately 5,571 acres of foraging habitat in the same 13 valleys as listed for golden eagles. This would result in a reduction in the amount of available habitat for this species until reclamation activities are completed and native vegetation is reestablished. Note that SWReGAP data may overestimate the amount of habitat used by bald eagles which have only been recorded in the valleys listed in the affected environment ROW section. Habitat loss is expected to have little effect on these raptor populations, based on the amount of suitable breeding and foraging habitat in the surrounding area. Facility maintenance would result in the permanent conversion of 888 acres of golden eagle nesting and foraging habitat in 11 valleys (those listed above, except Hamlin and Pahranagat); 331 acres of ferruginous hawk nesting and foraging habitat in 6 valleys (Cave, Dry Lake, Lake, Snake, Spring, and Steptoe); and 442 acres of bald eagle foraging habitat. If construction or facility maintenance activities were to occur during the breeding season (March through August), then direct impacts to breeding raptors could include the possible direct loss of nests, eggs, or young.

As discussed in the affected environment section, a total of 2 active ferruginous hawk nests were recorded within a 0.5 mile buffer of the ROWs in Snake and Spring valleys (Klinger and Williams 2005). NDOW's raptor database recorded numerous historic ferruginous hawk nests and one historic golden eagle nest within the ROW or a 0.5 mile buffer of the ROW. If construction or facility maintenance activities were to occur within 0.5 mile of an active raptor nest during breeding season, direct impacts could include abandonment of a new site or territory or the loss of eggs or in young, resulting loss of productivity for the breeding season. Loss of an active nest site, incubating adults, eggs or young would violate the MBTA and potentially could affect populations of raptor species that occur within the GWD Project area. In order to avoid impacts to active golden eagle and ferruginous hawk nests as well as nests of other raptor species, mitigation measure ROW-WL-3 is proposed.

Indirect impacts include increased habitat fragmentation effects as a result of increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic during surface disturbance activities. However, the degree of these potential impacts would depend on a number of variables including the location of the nest site, the species' relative sensitivity, breeding phenology, and possible topographic shielding. Nest abandonment could result from increased human noise and presence close to an active nest site.

Fragmentation effects for raptor species can result in the loss or alteration of habitat, reduction in prey base, and increased human disturbance. The loss of native habitat to human development has resulted in declines of hawks and eagles throughout the West (Boeker and Ray 1971; Schmutz 1984). In some cases, habitat changes have not reduced numbers of raptors, but they have resulted in shifts in species composition (Harlow and Bloom 1987). Impacts to small mammal populations due to habitat loss and fragmentation can result in a reduced prey base for raptors, resulting in lower raptor densities. Thompson et al. (1982) and Woffinden and Murphy (1989) found that golden eagles and ferruginous hawks had lowered nesting success where native vegetation had been lost and was unable to support jackrabbit (prey) populations. Furthermore, the increased number of access roads with the project would lead to greater public access. As a result, raptors may be disturbed from nests and roosts, thereby leading to displacement and reduced nesting success (Holmes et al. 1993; Postovit and Postovit 1987; Stalmaster and Newman 1978). Noise levels and human activity also can preclude otherwise acceptable raptor habitat from use (USFWS 2002). As with big game, vehicles that stop cause greater levels of disturbance to raptors than continuously moving vehicles (Holmes et al. 1993; White and Thurow 1985). Certain species of raptors are considered culturally significant to regional Tribes.

In addition to conducting occurrence surveys (ACM A.5.64), monitoring of construction (ACM A.1.2) and of known nests by qualified biologists (ACM A.5.68), use of predictive models to identify critical nesting locations (ACM A.5.62), and compliance reporting (ACM A.5.4 and A.5.7), the applicant has committed to the following ACMs to reduce potential impacts to these species (for more detail, see **Appendix E**):

- Develop a bird conservation strategy (BCS), including measures to reduce impacts to migratory birds, bald and golden eagles, and other sensitive birds (A.1.1);

- Pre-construction tree removal outside of nesting season as feasible and identification of exclusion areas; no eagle nests would be removed without obtaining proper permits (ACM A.5.68);
- Where appropriate, restriction of permitted activities from May 1 through July 15 within 0.5 mile of raptor nest sites unless the nest site has been determined to be inactive for at least the previous 5 years, (ACM A.5.69); and
- Design and construction of power poles and lines in accordance with APLIC (2006) recommendations (ACM A.5.66).

The USFWS issued a letter May 2012 (USFWS 2012) regarding BGEPA compliance for the proposed project that explains SNWA is developing a BCS and that a pre-construction monitoring program has been initiated.

Conclusion. Habitat for raptors would be temporarily disturbed by construction and a portion would be permanently converted to industrial uses as identified above. Habitat loss is expected to have little effect on these raptor populations, based on the amount of suitable breeding and foraging habitat in the surrounding area. ACMs and protections afforded in the RMPs would reduce potential impacts to raptors; however, impacts could result if construction or facility maintenance activities were to occur within 0.5 mile of an active raptor nest.

Proposed mitigation measures:

ROW-WL-3: Raptor survey and avoidance (Bald and Golden eagles are addressed in ROW-WL-13). ROW-WL-3 would be applied to address the potential for impacts from construction or facility maintenance activities within 0.5 mile of an active raptor nest.

ROW-WL-13: Eagle Nest Avoidance. Construction activities would be restricted within a 1-mile buffer zone, if a pair of breeding/nesting eagles is observed during raptor surveys. Construction may resume after eagles have fledged or the nest is abandoned. Effectiveness: This measure would be effective in avoiding impacts to nesting eagles. Effects on other resources: Conducting surveys would contribute to noise and human presence disturbance to wildlife, as well as the potential for vehicle collisions to wildlife.

Residual impacts include:

- The long-term (20 to 200 years) restoration periods for shrubland and woodland habitats disturbed by ROW construction make these habitats less suitable for forage and potential nesting sites for golden eagles or ferruginous hawks as well as less suitable for forage for bald eagles; and
- An unknown portion of habitats may be degraded because recovery did not fully occur or proximity to permanent facilities makes the habitat less suitable.

Western Burrowing Owl: Direct impacts to these species would include the incremental, long-term reduction of habitat quality in approximately 11,621 acres of nesting and foraging habitat in 13 valleys (Cave, Coyote Spring, Delamar, Dry Lake, Garnet, Hamlin, Hidden, Lake, Las Vegas, Pahranagat, Snake, Spring, and Steptoe valleys). The area of habitat affected by construction surface disturbance would represent less than 1 percent of modeled burrowing owl habitat within these basins. Facility maintenance would result in the permanent conversion of 858 acres of nesting and foraging habitat in 13 valleys, with habitat in Hamlin and Pahranagat valleys being marginally impacted. Other direct and indirect impacts would be the same as those discussed for golden eagle and ferruginous hawk.

In addition to pre-construction surveys in suitable habitat during nesting season (ACM A.5.41), avoiding active nesting burrows when feasible and identifying these avoidance areas using construction fencing (ACM A.5.42), the applicant has committed to the following ACMs to reduce potential impacts to this species (for more detail, see **Appendix E**):

- Seasonal restrictions during the active nesting season unless a qualified biologist verifies through non-invasive means that either: 1) the birds have not begun egg laying and incubation and 2) juveniles from the occupied burrows are foraging independently and are capable of independent survival, or the birds are no longer displaying evidence of nesting (ACM A.5.47);

- Mitigation for destruction of any active burrows within the ROW with enhanced or new burrows on adjacent BLM lands at a ratio of 2:1, with two enhanced or new burrows to each one active burrow that will be destroyed (ACM A.5.43); and
- Passive relocation of individuals during the fall to winter season prior to the start of construction, in coordination with the BLM, NDOW, and the USFWS (ACM A.5.44).

Conclusion. Habitat for burrowing owl would be temporarily disturbed by construction and a portion would be permanently converted to industrial uses as identified above. Habitat loss is expected to have little effect on burrowing owl populations in these basins, based on the amount of suitable breeding and foraging habitat in the surrounding area and the ACMs for this species. RMP guidance would further reduce potential ROW construction and facility maintenance impacts to the western burrowing owl.

Proposed mitigation measures:

None.

Residual impacts include:

- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.

Additional Special Status Birds: Direct and indirect impacts to additional special status birds would be the same as described for management concern birds earlier in the section. Mitigation measure ROW-WL-2 (USFWS Concurrence on Plans) and ROW-WL-3 (raptor nest survey and avoidance) would also apply to special status MBTA birds and raptor species. ACMs also would be the same.

Pygmy Rabbit: Direct impacts would result in the long-term reduction of approximately 3,634 acres of sagebrush habitat within the ROW and ancillary facility areas in nine basins (Cave, Delamar, Dry Lake, Hamlin, Lake, Pahranagat, Snake, Spring, and Steptoe). This would result in an incremental reduction in the amount of available habitat for this species until reclamation activities are completed and native vegetation is reestablished. The area of habitat affected by construction surface disturbance represents less than 1 percent of modeled pygmy rabbit habitat within these basins. Facility maintenance activities would result in the permanent conversion of 235 acres of habitat in four basins (Cave, Dry Lake, Lake, and Spring). Potential impacts also include the direct mortality of individual rabbits and loss of burrows (as a result of crushing from increased vehicle traffic and construction equipment, if present).

Indirect impacts include increased habitat fragmentation effects as a result of increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic during surface-disturbance activities. General habitat fragmentation, accidental wildfire, and power line impacts are described at the beginning of the ROW areas section, although it is important to note fragmentation of sagebrush habitat is of particular concern for pygmy rabbits because of their limited dispersal potential (Weiss and Verts 1984). Impacts from the operation of new power lines would include increased predation given the creation of additional nesting and perching sites for predators within pygmy rabbit habitat. Rabbits are considered culturally significant to regional Tribes.

The Ely RMP management action (E:SS-10) requires mitigation for the loss of special status species habitat as a result of discretionary permitted activities. Mitigation ratios are 2 acres of comparable habitat for every 1 acre of lost habitat, with the lost acreages determined on a project-by-project basis. ACM A.5.58 will address the loss of occupied pygmy rabbit habitat. ACM A.5.56 would conduct habitat treatments to benefit greater sage-grouse on federal lands outside the ROWs, equal to the acreage of sagebrush habitat disturbed by construction. These may also benefit pygmy rabbit if appropriate soil conditions are present. Acreage of sagebrush disturbed is presented in **Table 3.5-9**, Vegetation Resources. As mentioned under the greater sage-grouse discussion, the applicant also is working on development of a Candidate Conservation Agreement with Assurances for SNWA private properties in Spring Valley which could also benefit this species.

In addition to providing a Compliance Inspection Contractor for construction monitoring (ACM A.1.2) and surveys (ACM A.5.57), the applicant has committed to the following ACMs to reduce potential impacts to pygmy rabbit (for more detail, see **Appendix E**):

- Habitat improvement, habitat mitigation, livestock management, passive relocation, and enhanced restoration measures (ACMs A.5.58, A.5.59, A.5.60);
- Speed-limit restrictions that would reduce vehicle/wildlife impacts (ACM A.1.29);
- Design and operation of lighting to reduce visual impacts (ACMs A.11.2 and A.11.3), which also may benefit pygmy rabbits.
- Escape ramps to be installed at excavation areas that are left open overnight and checked periodically by a biological monitor (ACM A.1.42);
- Assurances that wildlife would not be harassed or intentionally harmed (ACM A.5.5); and
- Installation of perch discouraging devices (ACM A.5.8).

In ACM A.5.57, SNWA commits to conducting surveys for pygmy rabbit in the ROW in areas where pygmy rabbit have been recently documented or their sign observed. Given the potential lag time between the ROW pygmy rabbit survey conducted by SNWA and the construction of the proposed project, as well as other measures that may be implemented as a result of greater sage-grouse and MBTA nesting birds, it is appropriate to develop a survey methodology with the best available science 1-year prior to the time of construction and to use the best available science at the time. Similarly, ACM A.5.58 improves comparable habitat 2:1 for every 1 acre of occupied pygmy rabbit habitat. Given the current difficulty in accurately determining burrow activity (active/inactive) and recent research regarding pygmy rabbit movements from natal territories, areas currently unoccupied may become occupied if appropriate conditions exist. Key habitat features will be critical to the usefulness of the improved habitat conditions (e.g. appropriate soil types). Given the sensitivity of pygmy rabbits to fragmentation, project disturbance that interrupts occupied habitat will likely inhibit movement of rabbits across the ROW.

Conclusion. Habitat for pygmy rabbits would be temporarily disturbed by construction and a portion would be permanently converted to industrial uses as identified above. Protections defined in the RMPs and the ACMs would reduce potential ROW construction and facility maintenance impacts to pygmy rabbit.

Proposed mitigation measures:

While ACM A.5.57 commits to conducting surveys, mitigation measure ROW-WL-14 (Pygmy Rabbit Survey) clarifies when and in what habitat the surveys would be conducted. Similarly, ACM A.5.58 improves comparable habitat at a 2:1 ratio, ROW-WL-15 (Pygmy Rabbit Habitat Improvement) adds additional detail. Pygmy rabbit habitat improvement, as developed by the BLM and the SNWA in coordination with NDOW and USFWS, will need to occur in areas where correct soil conditions exist, so that priorities for improvement projects will likely be in areas of pinyon/juniper encroachment/invasion; areas where invasive species have negatively impacted known or former habitat; and areas where fires have impacted known or former habitat. Mitigation measure ROW-WL-16 (Priority Reclamation in Pygmy Rabbit Habitat) is proposed to more quickly reclaim areas of the ROW where occupied pygmy rabbit habitat has been fragmented. Mitigation measure ROW-WL-17 (Unanticipated Nesting Pygmy Rabbits) is proposed to avoid potential for loss of individual pygmy rabbits that may not have moved during passive relocation efforts.

ROW-WL-14. Pygmy Rabbit Surveys and Passive Relocation. Surveys would be conducted by qualified biologists prior to mowing and initial ground disturbance. Mowing to encourage passive relocation would be conducted between October 1 and February 15. Survey design would use the most recent BLM-approved pygmy rabbit survey and relocation protocol, and in coordination with NDOW and USFWS, include three key components: potential habitat survey; a subsequent pygmy rabbit sign survey conducted during best season for detection in Nevada; and a timeline for completion of these surveys that allows for passive relocation of rabbits ahead of initial ground-disturbing activities between October 1 and February 15. Effectiveness: This measure would be effective in identifying pygmy rabbit habitat and ensuring rabbits are moved out of project disturbance areas using passive relocation techniques. Effects on

other resources: Conducting surveys would contribute to noise and human presence disturbance to wildlife, as well as the potential for vehicle collisions to wildlife. Passive relocation efforts would also avoid potential impacts to nesting MBTA birds.

ROW-WL-15. Pygmy Rabbit Habitat Improvement. For the direct loss of occupied pygmy rabbit habitat, 2 acres of comparable habitat for every 1 acre of disturbed habitat would be improved. SNWA would coordinate with the BLM and NDOW to determine the specific areas for pygmy rabbit habitat improvements. Effectiveness: This measure would be effective in improving pygmy rabbit habitat in areas that would benefit the species. Effects on other resources: Improvements to sagebrush habitat will benefit other sagebrush dependent species. Habitat improvement efforts could negatively impact other species if they are conducted during a time frame sensitive to those species.

ROW-WL-16. Priority Reclamation Efforts in Pygmy Rabbit Habitat. Areas of disturbance along the ROW where passive relocation activities are conducted would be evaluated by the BLM in coordination with NDOW. Based on this evaluation, SNWA would prioritize reclamation, including but not limited to the planting of sagebrush seedlings, within the areas of disturbance to facilitate movement of rabbits across the ROW. These areas would be specifically identified in the Restoration Plan (ACM A.1.69) and considered in conjunction with efforts under ACM A.5.53 (Enhance restoration for greater sage-grouse). Effectiveness: This measure would be effective in shortening the time between disturbance and reclamation of pygmy rabbit habitat. Effects on other resources: Reclamation of sagebrush habitats early in the reclamation process will benefit other sagebrush dependent species.

ROW-WL-17. Unanticipated Nesting Pygmy Rabbits. If nesting pygmy rabbits are found during construction despite efforts of passive relocation, construction activities would be restricted within an appropriate buffer zone as approved by BLM in coordination with NDOW and USFWS. Effectiveness: This measure would be effective in avoiding direct loss of individuals that may not have moved out of the construction area during passive relocation efforts. Effects on other resources: No effects on other resources are anticipated.

Residual impacts include:

- The long-term (20 to 50 years) restoration period for sagebrush shrubland habitat disturbed by ROW construction makes this habitat unavailable for forage and cover for pygmy rabbit and contributes to habitat fragmentation.
- An unknown portion of habitat may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.

Bats: Direct impacts to special status bat species (i.e., big brown bat, Brazilian free-tailed bat, California myotis, fringed myotis, hoary bat, long-eared myotis, long-legged myotis, pallid bat, western pipistrelle, and western small-footed myotis; **Appendix F**, **Table F3.6-1**) would include the long-term reduction of foraging habitat within all the basins crossed by the ROW and ancillary facilities. This would result in an incremental reduction in the amount of available habitat for these species until reclamation activities are completed and native vegetation is reestablished. To demonstrate the range of impacts to bat habitat acreages, two species, the western pipistrelle and the long-eared myotis, were selected to provide the range of potential habitat impacts based on the difference in their SWReGAP modeled habitats. Approximately 12,030 acres of foraging habitat for western pipistrelle would be impacted during construction and 1,009 acres would be permanently converted. The area of habitat affected by construction surface disturbance would represent less than 1 percent of modeled western pipistrelle habitat within 13 basins crossed by the ROW. Long-eared myotis, one of the species not recorded in the ROW but that has been identified as having reasonable expectation of occurrence based on best available knowledge by wildlife management agencies, would have approximately 1,166 acres of foraging habitat impacted due to construction activities. The area of habitat affected by construction surface disturbance would represent less than 1 percent of modeled long-eared myotis habitat within 13 basins crossed by the ROW. Facility maintenance would convert 104 acres of foraging habitat for this species. No winter hibernacula, nursery colonies, or maternity roosts have been identified at proposed project facilities for any bat species; however, tree-clearing for ROW construction could result in loss of roosting sites for tree-roosting species. There may also be increased potential for mortality to bats from power line collisions.

Indirect impacts include increased habitat fragmentation effects as a result of increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic during surface-disturbance activities. Many bat species are easily disturbed by noise and human presence (Oliver 2000). These species

are especially sensitive to disturbance during roosting, maternity, and parturition. Abandonment of roost sites may occur due to increased human presence and noise disturbance (Oliver 2000).

In addition to providing a Compliance Inspection Contractor for construction monitoring (ACM A.1.2), the applicant has committed to the following ACM to reduce potential impacts to bats (for more detail, see **Appendix E**):

- Improve habitat conditions for bats by reducing or changing grazing in wet meadows on SNWA allotments (ACM C.2.18);
- Design water hauls with escape ramps(ACM A.5.72); and
- Design and operate lighting to reduce visual impacts (ACMs A.11.2 and A.11.3) which would also benefit bat species.

Conclusion. Habitat for bats would be temporarily disturbed by construction and a portion would be permanently converted to industrial uses as identified above. ACMs and the protections afforded in the RMPs would reduce potential ROW construction and facility maintenance impacts to bats.

Proposed mitigation measures:

None.

Residual impacts include:

- The long-term (20 to 200 years) restoration periods for woodland habitats disturbed by ROW construction make this habitat unavailable for forage and roosting for bats.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.

Dark Kangaroo Mouse: Direct impacts would result in the long-term reduction of approximately 7,732 acres (**Table 3.6-5**) of dark kangaroo mouse habitat (in Cave, Delamar, Dry Lake, Hamlin, Lake, Pahranagat, Snake, Spring, and Steptoe valleys). This would result in an incremental reduction in the amount of available habitat for this species until reclamation activities are completed and native vegetation is reestablished. The area of habitat impacted by construction surface disturbance is less than 1 percent of modeled dark kangaroo mouse habitat within these basins. Facility maintenance would result in the permanent conversion of 557 acres of habitat. Potential impacts also could result in the direct mortalities of individual mice (as a result of crushing from increased vehicle traffic and construction equipment, if present).

Indirect impacts include increased habitat fragmentation effects as a result of increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic during surface-disturbance activities. Impacts from the operation of new power lines would include increased predation due to the creation of additional nesting and perching sites for predators within mouse habitat.

In addition to providing a Compliance Inspection Contractor for construction monitoring (ACM A.1.2), the applicant has committed to reducing potential impacts to this species by trapping and relocating individual desert valley kangaroo mice (a subspecies of the dark kangaroo mouse) within known habitat if determined appropriate (ACM A.5.61). NDOW has raised questions as to whether translocations would be benign to nearby recipient populations.

Conclusion. Habitat for dark kangaroo mouse would be temporarily disturbed by construction and a portion would be permanently converted to industrial uses as identified above. The ACMs and protections afforded in the RMPs would reduce potential ROW construction and facility maintenance impacts to the dark kangaroo mouse, but some questions remain as to the benefit of proposed translocations.

Proposed mitigation measures:

ROW-WL-18: **Coordination with NDOW on Conservation Measures for Dark Kangaroo Mouse**. The SNWA, prior to being issued the Notice to Proceed, would work with NDOW on developing research objectives, protocols, and implementation plan(s) to identify conservation measures for the SNWA project's potential effects on the dark kangaroo mouse and its habitat. The implementation plan(s) must address mitigation, minimization, or avoidance of impacts from this project on dark kangaroo mouse and its habitat for the duration of construction, maintenance, and operation. A Notice to Proceed would be issued upon receipt of confirmation by NDOW that this process has been completed and that conservation measures for the dark kangaroo mouse and its habitat have been developed. Effectiveness: This measure would be effective in mitigating impacts to dark kangaroo mouse as it would gather key information still needed to effectively manage the species. Effects on other resources: If the measure includes surveys, activities would contribute to noise and human presence disturbance to wildlife as well as the potential for vehicle collisions to wildlife.

Residual impacts include:

- The long-term (20 to 200 years) restoration periods for shrublands and woodlands in habitats disturbed by ROW construction make these habitats unavailable for forage and cover for dark kangaroo mouse.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.
- Potential mortalities may occur to dark kangaroo mouse from construction equipment and soil movement.

Banded Gila Monster. Direct impacts to this species would include the long-term reduction of habitat quality in approximately 2,627 acres of suitable habitat (in Coyote Spring, Garnet, Hidden Valley, and Las Vegas valleys) and would result in an incremental reduction in the amount of available habitat until reclamation activities are completed and native vegetation is reestablished. The area of habitat affected by construction surface disturbance is less than 1 percent of modeled gila monster habitat within these basins. Facility maintenance would result in the permanent conversion of 248 acres of habitat in the same valleys listed above. Potential impacts also could result in the direct mortalities of individuals (as a result of crushing from increased vehicle traffic and construction equipment, if present) as well as increased potential for illegal collection.

Indirect impacts include increased habitat fragmentation effects as a result of increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic during surface-disturbance activities as well as potential for increased illegal collection.

In addition to pre-construction surveys by qualified biologists that may follow the NDOW protocol (ACM A.5.37), the applicant has committed to the following ACMs to reduce potential impacts to this species (for more detail, see **Appendix E**):

- Speed-limit restrictions to reduce vehicle/wildlife impacts (ACM A.1.29);
- Individuals that are found during pre-construction surveys will be moved out of harm's way (ACM A.5.38);
- Assurances that wildlife would not be harassed or intentionally harmed (ACM A.5.5); and
- Immediate contact to the NDOW if a gila monster is found, and reporting of all gila monster observations by project workers (ACM A.5.39).

NDOW has raised concerns regarding the potential for landscape and smaller scale impacts to combine negatively within the project area so that standard protection measures may not be sufficient to mitigate for potential impacts. Further, ACM A.5.37 commits SNWA to conduct banded Gila monster surveys, but it is not specific enough with regard to use of the NDOW protocol.

Conclusion. Habitat for Gila monster would be temporarily disturbed by construction and a portion would be permanently converted to industrial uses as identified above. ACMs would reduce potential ROW construction and facility maintenance impacts to Gila monster.

Proposed mitigation measures:

ROW-WL-19: **Coordination with NDOW on Conservation Measures for Banded Gila Monster**. The SNWA, prior to being issued the Notice to Proceed, would work with NDOW on developing research objectives, protocols, and implementation plan(s) to identify conservation measures for the SNWA project's potential effects on the banded Gila monster and its habitat. The implementation plan(s) must address mitigation, minimization, or avoidance of impacts from this project on banded Gila monster and its habitat for the duration of construction, maintenance, and operation. A Notice to Proceed would be issued upon receipt of confirmation by NDOW that this process has been completed and that conservation measures for the gila monster and its habitat have been developed. Effectiveness: This measure would be effective in mitigating impacts to Gila monster as it would gather key information still needed to effectively manage the species. Effects on other resources: If the measure includes surveys, activities would contribute to noise and human presence disturbance to wildlife as well as the potential for vehicle collisions to wildlife.

ROW-WL-20: Banded Gila Monster Surveys. Within potential habitat for banded Gila monster and chuckwalla, pre-construction surveys of the ROW would be conducted by qualified biologists to find and move individuals from project disturbance areas. The surveys would be conducted in accordance with NDOW's most current banded Gila monster survey protocol. All occupied burrows found in the construction zone would be examined and excavated as described for the desert tortoise. If a banded Gila monster is found, NDOW would be immediately contacted. Effectiveness: This measure would be effective in detecting Gila monsters in the ROW prior to disturbance and would move them out of harm's way. Effects on other resources: Conducting surveys would contribute to noise and human presence disturbance to wildlife, as well as the potential for vehicle collisions to wildlife. This measure also could provide a record of other species that could be potentially affected by the project.

Residual impacts include:

- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.
- Potential mortalities to Gila monster from construction equipment and soil movement.

Mojave Poppy Bee: Direct impacts would result in the long-term reduction of approximately 1,718 acres of potentially suitable habitat for this bee species in Coyote Spring Valley and an incremental reduction in the amount of available habitat for this species, until reclamation activities are completed and native vegetation is reestablished. Facility maintenance would result in the permanent conversion of 120 acres of habitat in Coyote Spring Valley. Other impacts could include the direct mortality of individuals (as a result of crushing from increased vehicle traffic and construction equipment, if present). Given the lack of information on this species (e.g. range, distribution, reasons for rarity, degree of threat), the level of impact as a result of this project is not known. There are no proposed species-specific ACMs. It is assumed that potential impacts to this species would be minimized through implementation of mitigation measure ROW-VEG-1 (reducing spread of invasive weeds).

Conclusion. Habitat for Mojave poppy bee would be temporarily disturbed by construction and a portion would be permanently converted to industrial uses as identified above. There are no proposed species-specific ACMs.

Proposed mitigation measures:

ROW-VEG-3: Green Stripping. This measure would assist in reducing impacts to Mojave poppy bee.

Residual impacts include:

- An unknown portion of habitats that may be degraded because recovery did not fully occur.

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3.6.2.3 Alternative D

The same ROW construction and facility maintenance issues discussed for the Proposed Action and Alternatives A through C would apply to Alternative D. The following discussion describes acreage and species location-specific differences for this alternative.

The Alternative D ROW ends at the White Pine County line. Surface impacts in White Pine County are removed or reduced as a result.

Summary

General Habitat Loss and Alteration

Construction would disturb approximately 8,843 acres of wildlife habitat, primarily consisting of shrub-scrub types including sagebrush shrubland (44 percent), Mojave mixed desert shrubland (35 percent) and greasewood/saltbush shrubland (19 percent), with lesser amounts of woodland, grasslands and other types comprising the remaining 2 percent. Shrub/scrub and woody vegetations would be impacted long term, while grass and forb vegetation would be impacted over the short term when considering reclamation time frame. Facility maintenance would result in the permanent conversion of approximately 823 acres of terrestrial wildlife habitat in similar proportions to construction (within 4 percent).

Habitat fragmentation would result from the construction of the various project facilities including the development of access roads, pipelines, electrical power lines, and various above-ground facilities including pumping stations and electrical substations. Other fragmentation effects such as increased noise, elevated human presence, dispersal of noxious and invasive weeds species and dust deposition from unpaved road traffic would extend beyond the boundaries of the project ROWs.

Accidental wildfires could be initiated during construction and facility maintenance activities and could cause minor to major impacts on forage and cover availability to all wildlife, depending on the acreage burned and whether any areas of particular species-specific value were disturbed. Impacts from wildfire would result in mortalities of less mobile species (e.g., small mammals, birds, reptiles, amphibians, invertebrates) and short-term displacement of wildlife from the impacted area.

The operation of proposed electrical power lines would incrementally increase the potential for electrocution for birds and collision potential for birds and bats, and could serve as predator perches and nest sites, increasing predation potential on a number of species.

Species of Management Concern

Big Game: Construction disturbance would result in reduction of forage areas and habitat fragmentation on a long-term basis for big game species, including antelope (4,571 acres), elk (2,704 acres), mule deer range (2,949 acres), mule deer crucial summer range (101 acres), mule deer crucial winter range (3 acres), and desert bighorn sheep occupied habitat (260 acres). Disturbance acres represent less than 1 percent of the available species habitat within the basin impacted. Facility maintenance would result in the permanent conversion of habitat to industrial uses including antelope (391 acres), elk (180 acres), mule deer range (302 acres), mule deer crucial summer range (16 acres), and desert bighorn sheep occupied habitat (11 acres). Impacts also would include displacement of individuals and potential loss of breeding success given habitat alteration, exposure to construction/maintenance movements and noise and higher levels of human activity. The proposed GWD Project also would have potential to cause long-term, elevated, traffic-caused mortality. While the area of habitat affected by construction surface disturbance would represent less than 1 percent of the surface area of these habitat ranges within the hydrologic basins occupied by Alternative D, the location of ROW construction could impact local herds and migration corridors. Protections provided in the RMPs and the ACMs would reduce potential impacts to big game species. However, in order to address the permanent conversion of 16 acres of mule deer crucial summer habitat and 11 acres of desert bighorn sheep occupied habitat, as well as the long-term surface disturbance of mule deer crucial summer range (101 acres) and mule deer crucial winter range (3 acres), mitigation measure ROW-WL-1 is proposed.

Mitigation measure ROW-WL-1 specifies that SNWA will improve 2 acres of comparable big game key habitat for each 1 acre disturbed.

Other Terrestrial Species of Management Concern: Direct impacts to small mammals, reptiles, game and other bird species of management concern (including raptors) would include the incremental, long-term surface disturbance of 8,843 acres of habitat and increased fragmentation, until vegetation became reestablished and construction noises ceased. Facility maintenance would result in the permanent conversion of 823 acres of habitat to industrial uses. Fragmentation effects would be incremental, but species that require large tracts of unbroken habitat such as sagebrush obligate species may not be able to complete their life functions and this project may contribute to general population declines. Potential impacts also likely would include:

- Displacement of mobile wildlife species on a short-term basis from noise and human activity from construction and on a long-term basis for facility maintenance;
- Mortalities of less-mobile or burrowing species as a result of crushing from increased vehicle traffic and construction equipment and abandonment or loss of eggs or young;
- Disruption of breeding success (displacement or nest abandonment) of migratory birds from noise or human activity if construction occurred during breeding season; and
- Potential for small wildlife to be trapped in water troughs and be drowned.

ACMs that would reduce potential impacts to wildlife include: speed limit restrictions (ACM A.1.29), traffic management to reduce vehicle trips (ACM A.1.28), escape ramps in water troughs (ACM A.5.72), timing of ground clearing to avoid critical nesting periods for migratory birds as feasible (ACM A.5.63), a bird conservation strategy (ACM A.1.1), and pre-construction bird surveys and avoidance until birds have fledged, or consultation with the BLM (ACM A.5.65). Protections provided in the RMPs and the ACMs would reduce potential impacts to other terrestrial wildlife species of management concern. However, mitigation measure ROW-WL-2 (USFWS concurrence on plans) is added to obtain concurrence from USFWS on plans that address species protected under MBTA or BGEPA and ROW-WL-3 (Raptor nest survey and avoidance) addresses pre-construction surveys and nest avoidance for raptors.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on terrestrial wildlife resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Special Status Species

Desert Tortoise: Direct impacts to the desert tortoise would include the incremental, long-term reduction of approximately 2,350 acres of desert tortoise habitat (1,759 acres of which is designated critical habitat) within 5 basins (Las Vegas, Garnett, Hidden, Coyote Spring, and Pahranagat valleys) from ROW construction until reclamation activities have been completed and native vegetation is reestablished. Facility maintenance would result in the permanent conversion of habitat to industrial uses including approximately 245 acres of critical habitat and 86 acres of non-critical habitat. Potential impacts also could include direct mortality of individual tortoises as a result of crushing from increased vehicle traffic and construction equipment, if present. Indirect impacts would result from increased noise and human presence and increased habitat fragmentation. In addition to construction monitoring by the BLM and USFWS approved qualified biologists (ACM A.5.30), adherence to USFWS-approved desert tortoise survey protocols (ACMs A.5.17-20, 30), and acquisition of appropriate state and federal permits or letters of authorization prior to handling desert tortoises and their parts (ACM A.5.16), development of a blasting plan (ACM A.1.1) the applicant has committed to the following ACMs to reduce potential impacts to desert tortoise (for more detail, see **Appendix E**): procedures for handling and moving individuals out of harm's way (ACM A.5.16-17, 21-27, A.5.34), placement of exclusion fencing (ACM A.5.18), speed limit restrictions that would reduce vehicle/wildlife impacts (ACM A. 1.29), installation of perch discouraging devices (ACM A.5.8), removal of entrapped animals from trenches (ACM A.1.42), and reporting of acres disturbed, remuneration fees paid, and number of tortoises taken during project activities (ACM A.5.36). Compliance with the ESA would require implementation of measures to reduce the effects of anticipated take of desert tortoise, including through habitat loss or degradation. Potential impacts would be reduced based on compliance with recovery plans and RMPs and adherence to ACMs. The applicant would coordinate with USFWS on this species.

Greater Sage-grouse: Incremental, long-term reduction of 1,310 acres of PPH and 1,124 acres of PGH, animal displacement (short and long term), and habitat fragmentation (long term) would result from this alternative. Facility maintenance would result in the permanent conversion of approximately 55 acres of PPH and 98 acres of PGH to industrial uses. Other impacts include potential mortalities from vehicle traffic (short and long-term), potential loss of nests, eggs or young, and potential for increased predation given additional perching sites on power lines. There are 8 active leks within 4 miles of proposed ROWs, 8 of them within 4 miles of proposed overhead power lines. ACMs that would reduce potential impacts to greater sage-grouse include specific facility siting criteria (ACM A.5.49), design and operation of lighting (ACMs A.11.2 and 3), seasonal timing restrictions (ACM A. 5.51), enhanced restoration measures (ACM A.5.53), perch discouraging devices (ACM A.5.8) and habitat enhancement (ACMs A.5.54, 55, and 56). In addition, mitigation measures ROW WL-4 (Specific lek avoidance – Burying power lines), ROW WL-5 (Specific lek avoidance –Siting of power lines), ROW-WL-6 and ROW-WL-7 (Sage-grouse habitat restoration), ROW-WL-8 (Greater sage-grouse monitoring), ROW-WL-9 and ROW-WL-10 (Greater sage-grouse timing restrictions), ROW-WL-11 (Fence marking) and ROW-WL-12 (Co-location of power lines) have been added.

Raptors: Incremental, long-term reduction of approximately 8,615 acres of golden eagle foraging habitat and 3,170 acres of ferruginous hawk nesting and foraging habitat and 4,165 acres of bald eagle foraging habitat would result from this alternative. Facility maintenance would result in the permanent conversion of 700 acres of golden eagle foraging habitat, and 220 acres of ferruginous hawk nesting and foraging habitat and 360 acres of bald eagle foraging habitat to industrial uses. There are no ferruginous hawks or golden eagle nests recorded within 0.5 mile of the ROW. ACMs that would reduce potential impacts to these species include development of a bird conservation strategy including measures to reduce impacts to migratory birds, bald and golden eagles, and other sensitive birds (ACM A.1.1), design of power lines following APLIC recommendations to avoid electrocution potential (ACM A.5.66), construction timing restrictions where appropriate (ACM A.5.69), pre-construction surveys and nest avoidance where feasible (ACM A.5.65), and pre-construction tree removal as feasible (ACM A.5.68). ACMs and the protections afforded in the RMPs would reduce potential ROW construction and facility maintenance impacts to raptors; however, raptors would not be fully protected. As such, mitigation measures ROW-WL-3 for preconstruction surveys and nest avoidance, and ROW-WL-13 for eagle nest avoidance is proposed.

Western Burrowing Owl: Direct impacts would include the incremental, long-term reduction of approximately 8,320 acres of suitable foraging habitat (shrub-scrub) and facility maintenance would result in the permanent conversion of 680 acres of nesting and foraging habitat to industrial uses. Impacts include potential mortalities from vehicle traffic (short term and long term). ACMs that would reduce potential impacts to burrowing owl include mitigation for destruction of any active burrows within the ROW with 2 enhanced or new burrows to each 1 active burrow that will be destroyed (ACM A.5.43), passive relocation of individuals (ACM A.5.44), and seasonal restrictions around occupied burrows (ACM A.5.47). No additional species-specific mitigation is proposed.

Pygmy Rabbit: Direct impacts would include the incremental, long-term reduction of approximately 2,810 acres of suitable habitat (shrub-scrub) would result from this alternative and facility maintenance would result in the permanent conversion of 200 acres of habitat to industrial uses. Impacts would include displacement of animals due to noise and human activity (short and long term), habitat fragmentation (long term), direct mortality that could occur during construction from crushing by vehicles or equipment as well as potential for increased predation given additional perching sites on power lines. ACMs that would reduce potential impacts to pygmy rabbits include, speed limit restrictions (ACM A.1.29), installation of perch discouraging devices (ACM A.5.8), and habitat improvement, mitigation, livestock management, and enhanced restoration measures (ACMs A.5.58, 59, 60). These ACMs and the protections afforded in the RMPs would reduce ROW construction and facility maintenance impacts to pygmy rabbit, however, the surveys and habitat improvement committed to in ACMs are further clarified in mitigation measures ROW-WL-14 (Pygmy rabbit surveys), ROW-WL-15 and ROW-WL-16 (Pygmy rabbit habitat improvement and reclamation). ROW-WL-17 is added to protect nesting pygmy rabbits in the event pygmy rabbits remain after passive relocation is conducted.

Bat Species: Direct impacts would include the incremental, long-term reduction of approximately 690 to 8,610 acres of foraging habitat and facility maintenance would result in the permanent conversion of 93 to 820 acres of habitat to industrial uses (based on Western pipistrelle and long-eared myotis models, **Table 3.6-5** footnote 2). No winter hibernacula, nursery colonies, or maternity roosts have been identified at proposed project facilities; however, tree-clearing for ROW construction could result in loss of roosting sites for tree-roosting species. Impacts also would include displacement of animals due to noise and human activity (short and long term), and habitat fragmentation (long

term). There also may be increased mortality to bats from potential power line collisions. ACMs that would reduce potential impacts to bats include improving habitat conditions on SNWA grazing allotments (ACM C.2.18), lighting design (ACMs A.11.2 and 3), and escape ramps in water troughs (ACM A.5.72). No additional species-specific mitigation is proposed.

Dark Kangaroo Mouse: Direct impacts would include the incremental, long-term reduction of approximately 4,997 acres of dark kangaroo mouse habitat would result from this alternative and facility maintenance would result in the permanent conversion of 400 acres of habitat to industrial uses in 6 valleys. Other impacts include potential mortalities from vehicle traffic (short and long-term) and habitat fragmentation (long term). ACMs that would reduce potential impacts to dark kangaroo mouse include speed limit restrictions (ACM A.1.29), installation of perch discouraging devices (ACM A.5.58), and trapping and relocating individual desert valley kangaroo mice (a subspecies of the dark kangaroo mouse) within known habitat if determined appropriate (ACM A.5.61). In addition, mitigation measures ROW-WL-18 (Coordination with NDOW on conservation measures for dark kangaroo mouse), has been added.

Gila Monster: Direct impacts would include the incremental long-term reduction of approximately 2,627 acres of potential habitat and facility maintenance would result in the permanent conversion of 248 acres of habitat to industrial uses. Impacts include potential mortalities from vehicle traffic (short and long term), habitat fragmentation (long term), and increased potential for illegal collection. ACMs that would reduce potential impacts to gila monster include speed limit restrictions (ACM A.1.29), installation of perch discouraging devices (ACM A.5.58), and preconstruction surveys and notifications when individuals are moved from project disturbance areas (ACM A.5.38 and 39). In addition, mitigation measures ROW WL-19 (Coordination with NDOW on conservation measures for Banded Gila monster), and ROW-WL-20 (Banded Gila monster surveys) have been added.

Mojave Poppy Bee: Direct impacts would include the incremental long-term reduction of approximately 1,718 acres of potential habitat would result from this alternative and facility maintenance would result in the permanent conversion of 120 acres of habitat to industrial uses. Impacts include potential mortalities from vehicle traffic (short and long term) and habitat fragmentation (long term). Potential impacts to this species would be minimized through implementation of a mitigation measure in vegetation ROW VEG-3. No additional species-specific mitigation is proposed.

Residual impacts include:

- The same types of residual impacts would occur except that habitat effects would be less than the Proposed Action.

3.6.2.4 Alternatives E and F

The same ROW construction and facility maintenance issues discussed for the Proposed Action and Alternatives A through C would apply to Alternatives E and F. The following discussion describes acreage and species location-specific differences for this alternative.

Summary:

General Habitat Loss and Alteration

Construction would disturb approximately 10,696 acres of wildlife habitat, primarily consisting of shrub-scrub types including sagebrush shrubland (47 percent), Mojave mixed desert shrubland (29 percent), and greasewood/saltbush shrubland (21 percent), with lesser amounts of woodland, grasslands, and other types comprising the remaining 3 percent. Shrub/scrub and woody vegetations would be impacted long term, while grass and forb vegetation would be impacted over the short term when considering the reclamation time frames. Facility maintenance would result in the permanent conversion of approximately 960 acres of terrestrial wildlife habitat in similar proportions to construction (within 4 percent).

Habitat fragmentation would result from the construction of the various project facilities including the development of access roads, pipelines, electrical power lines, and various above-ground facilities including pumping stations and electrical substations. Other fragmentation effects such as increased noise, elevated human presence, dispersal of noxious and invasive weeds species and dust deposition from unpaved road traffic would extend beyond the boundaries of the project ROWs.

Accidental wildfires could be initiated during construction and facility maintenance activities and could cause minor to major impacts on forage and cover availability to all wildlife, depending on the acreage burned and whether any areas of particular species-specific value were disturbed. Impacts from wildfire would result in mortalities of less mobile species (e.g., small mammals, birds, reptiles, amphibians, invertebrates) and short-term displacement of wildlife from the impacted area.

The operation of proposed electrical power lines would incrementally increase the potential for electrocution for birds and collision potential for birds and bats, and could serve as predator perches and nest sites, increasing predation potential on a number of species.

Species of Management Concern

Big Game: Construction disturbance would result in reduction of forage areas and habitat fragmentation on a long-term basis for big game species, including antelope (6,345 acres), elk (4,019 acres), mule deer range (3,547 acres), mule deer crucial summer range (161 acres), mule deer crucial winter range (3 acres), and desert bighorn sheep occupied habitat (260 acres), and potential habitat (25 acres). Disturbance acres represent less than 1 percent of the available species habitat within the basins impacted. Facility maintenance would result in the permanent conversion of habitat to industrial uses including antelope (520 acres), elk (283 acres), mule deer range (326 acres), mule deer crucial summer range (23 acres), and desert bighorn sheep occupied habitat (11 acres). Impacts would also include displacement of individuals and potential loss of breeding success given habitat alteration, exposure to construction/maintenance movements and noise and higher levels of human activity. The proposed project also would have potential to cause long-term, elevated, traffic-caused mortalities. While the area of habitat affected by construction surface disturbance would represent less than 1 percent of the surface area of these habitat ranges within the hydrologic basins occupied by Alternatives E and F, the location of ROW construction could impact local herds and migration corridors. Protections provided in the RMPs and the ACMs would reduce potential impacts to big game species. However, in order to address the permanent conversion of 23 acres of mule deer crucial summer habitat and 11 acres of desert bighorn sheep occupied habitat, as well as the long-term surface disturbance of mule deer crucial summer range (161 acres), mule deer crucial winter range (3 acres), and desert bighorn sheep occupied habitat (260 acres), mitigation measure ROW-WL-1 (Big game habitat restoration and improvement) is proposed.

Other Terrestrial Species of Management Concern: Direct impacts to small mammals, reptiles, game, and other bird species of management concern (including raptors) would include the incremental, long-term surface disturbance of 10,696 acres of habitat and increased fragmentation until vegetation became reestablished and construction noises ceased. Facility maintenance would result in the permanent conversion of approximately 960 acres of habitat to industrial uses. Fragmentation effects would be incremental, but species that require large tracts of unbroken habitat such as sagebrush obligate species may not be able to complete their life functions and this project may contribute to general population declines. Potential impacts also likely would include:

- Displacement of mobile wildlife species on a short-term basis from noise and human activity from construction, and on a long-term basis for facility maintenance;
- Mortalities of less-mobile or burrowing species as a result of crushing from increased vehicle traffic and construction equipment, and abandonment or loss of eggs or young;
- Disruption of breeding success (displacement or nest abandonment) of migratory birds from noise or human activity if construction occurred during breeding season; and
- Potential for small wildlife to be trapped in water storage devices and be drowned.

ACMs that would reduce potential impacts to wildlife include: speed limit restrictions (ACM A.1.29), traffic management to reduce vehicle trips (ACM A.1.28), escape ramps in trenches and water storage devices (ACM A.5.72), timing of ground clearing to avoid critical nesting periods for migratory birds as feasible (ACM A.5.63), and pre-construction bird surveys and avoidance until birds have fledged, or consultation with the BLM (ACM A.5.65). Protections provided in the RMPs and the ACMs would reduce potential impacts to other terrestrial wildlife species of management concern. No additional mitigation is proposed. However, mitigation measure ROW-WL-2 is added to obtain concurrence from USFWS on plans that address species protected under MBTA or BGEPA, and ROW-WL-3 addresses pre-construction surveys and nest avoidance for raptors.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on terrestrial wildlife resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Special Status Species

Desert Tortoise: Direct impacts to the desert tortoise would include the incremental, long-term reduction of approximately 2,350 acres of desert tortoise habitat (1,759 acres of which is designated critical habitat) within 5 basins (Las Vegas, Garnett, Hidden, Coyote Spring and Pahranagat valleys) from ROW construction until reclamation activities have been completed and native vegetation is reestablished. Facility maintenance would result in the permanent conversion of habitat to industrial uses including approximately 245 acres of critical habitat and 86 acres of non-critical habitat. Potential impacts also could include direct mortality of individual tortoises as a result of crushing from increased vehicle traffic and construction equipment, if present. Indirect impacts would result from increased noise and human presence and increased habitat fragmentation. In addition to construction monitoring by BLM and USFWS approved qualified biologists (ACM A.5.30), adherence to USFWS-approved desert tortoise survey protocols (ACMs A.5.17-20, 30), and acquisition of appropriate state and federal permits or letters of authorization prior to handling desert tortoises and their parts (ACM A.5.16), development of a blasting plan (ACM A.1.1) the applicant has committed to the following ACMs to reduce potential impacts to desert tortoise (for more detail, see **Appendix E**): procedures for handling and moving individuals out of harm's way (ACM A.5.16-17, 21-27, A.5.34), placement of exclusion fencing (ACM A.5.18), speed limit restrictions that would reduce vehicle/wildlife impacts (ACM A. 1.29), installation of perch discouraging devices (ACM A.5.8), removal of entrapped animals from trenches (ACM A.1.42), and reporting of acres disturbed, remuneration fees paid, and number of tortoises taken during project activities (ACM A.5.36). Compliance with the ESA would require implementation of measures to reduce the effects of anticipated take of desert tortoise, including through habitat loss or degradation. Potential impacts would be reduced based on compliance with recovery plans and RMPs and adherence to ACMs. The applicant would coordinate with USFWS on this species.

Greater Sage-grouse: Incremental, long-term reduction of 2,232 acres of PPH and 1,636 acres of PGH, animal displacement (short and long term), and habitat fragmentation (long term) would result from this alternative. Facility maintenance would result in the permanent conversion of approximately 134 acres of PPH and 126 acres of PGH to industrial uses. Other impacts include potential mortalities from vehicle traffic (short and long-term), potential loss of nests, eggs or young, and potential for increased predation given additional perching sites on power lines. There are 18 active leks within 4 miles of proposed ROWs, 18 of them within 4 miles of proposed overhead power lines. ACMs that would reduce potential impacts to greater sage-grouse include specific facility siting criteria (ACM A.5.49), design and operation of lighting (ACM A.11.2 and 3), seasonal timing restrictions (ACMs A.5.51), enhanced restoration measures (ACM A.5.53), perch discouraging devices (ACM A.5.8), and habitat enhancement (ACM A.5.54, 55, and 56). In addition, mitigation measures ROW WL-4 (Specific lek avoidance – Burying power lines), ROW WL-5 (Specific lek avoidance – Siting of power lines) ROW-WL-6 and ROW-WL-7 (Sage-grouse habitat restoration), ROW-WL-8 (Greater sage-grouse monitoring), ROW-WL-9 and ROW-WL-10 (Greater sage-grouse timing restrictions), ROW-WL-11 (Fence marking) and ROW-WL-12 (Co-location of power lines).

Raptors: Direct impacts would include the incremental, long-term reduction of approximately 10,460 acres of golden eagle foraging habitat, 4,340 acres of ferruginous hawk nesting and foraging habitat, and 4,900 acres of bald eagle foraging habitat would result from this alternative. Facility maintenance would result in the permanent conversion of 835 acres of golden eagle foraging habitat, 306 acres of ferruginous hawk nesting and foraging habitat, and 410 acres of bald eagle foraging habitat to industrial uses. Two ferruginous hawks nests are recorded within 0.5 mile of the ROW (Spring and Snake valleys). ACMs that would reduce potential impacts to these species include development of a bird conservation strategy including measures to reduce impacts to migratory birds, bald and golden eagles, and other sensitive birds (ACM A.1.1), design of power lines following APLIC recommendations to avoid electrocution potential (ACM A.5.66), construction timing restrictions where appropriate (ACM A.5.69), pre-construction surveys and nest avoidance where feasible (ACM A.5.65), and pre-construction tree removal as feasible (ACM A.5.68). ACMs and the protections afforded in the RMPs would reduce potential impacts to raptors; however, raptors would not be fully protected. As such, mitigation measures ROW-WL-3 for preconstruction surveys and nest avoidance, and ROW-WL-13 for eagle nest avoidance is proposed.

Western Burrowing Owl: Direct impacts would include the incremental, long-term reduction of approximately 10,070 acres of suitable foraging habitat (shrub-scrub) and facility maintenance would result in the permanent conversion of 808 acres of nesting and foraging habitat to industrial uses. Impacts include potential mortalities from vehicle traffic (short term and long term). ACMs that would reduce potential impacts to burrowing owl include mitigation for destruction of any active burrows within the ROW; 2 enhanced or new burrows to each 1 active burrow that will be destroyed (ACM A.5.43), passive relocation of individuals (ACM A.5.44), and seasonal restrictions around occupied burrows (ACM A.5.47). No additional species-specific mitigation is proposed.

Pygmy Rabbit: Direct impacts would include the incremental, long-term reduction of approximately 3,320 acres of suitable habitat (shrub-scrub) and facility maintenance would result in the permanent conversion of 235 acres of habitat to industrial uses. Impacts would include displacement of animals due to noise and human activity (short and long term), habitat fragmentation (long term), direct mortality that could occur during construction from crushing by vehicles or equipment as well as potential for increased predation given additional perching sites on power lines. ACMs that would reduce potential impacts to pygmy rabbits include, speed limit restrictions (ACM A.1.29), installation of perch discouraging devices (ACM A.5.8), and habitat improvement, mitigation, livestock management, and enhanced restoration measures (ACMs A.5.58, 59, 60). ACMs and the protections afforded in the RMPs would reduce potential impacts to pygmy rabbit, however, the surveys and habitat improvement committed to in ACMs are further clarified in mitigation measures ROW-WL-14 (Pygmy rabbit surveys), ROW-WL-15 and ROW-WL-16 (Pygmy rabbit habitat improvement and reclamation). ROW-WL-17 is added to protect nesting pygmy rabbits in the event pygmy rabbits remain after passive relocation is conducted.

Bat Species: Direct impacts would include the incremental, long-term reduction of approximately 1,033 to 10,420 acres of foraging habitat and facility maintenance would result in the permanent conversion of 101 to 955 acres of habitat to industrial uses (based on Western pipistrelle and long-eared myotis models, **Table 3.6-5** footnote 2). No winter hibernacula, nursery colonies, or maternity roosts have been identified at proposed project facilities; however, tree-clearing for ROW construction could result in loss of roosting sites for tree-roosting species. Impacts also would include displacement of animals due to noise and human activity (short and long term) and habitat fragmentation (long term). There also may be increased mortality to bats from potential power line collisions. ACMs that would reduce potential impacts to bats include improving habitat conditions on SNWA grazing allotments (ACM C.2.18), lighting design (ACM A.11.2 and 3), and escape ramps in water troughs (ACM A.5.72). No additional species-specific mitigation is proposed.

Dark Kangaroo Mouse: Direct impacts would include the incremental, long-term reduction of approximately 6,583 acres of dark kangaroo mouse habitat and facility maintenance would result in the permanent conversion of 521 acres of habitat to industrial uses in 7 valleys. Other impacts include potential mortalities from vehicle traffic (short and long-term) and habitat fragmentation (long term). ACMs that would reduce potential impacts to dark kangaroo mouse include speed limit restrictions (ACM A.1.29), installation of perch discouraging devices (ACM A.5.58), and trapping and relocating individual desert valley kangaroo mice (a subspecies of dark kangaroo mouse) within known habitat if determined appropriate (ACM A.5.61). In addition, mitigation measures ROW-WL-18 (coordination with NDOW on conservation measures for dark kangaroo mouse), has been added.

Gila Monster: Direct impacts would include the incremental long-term reduction of approximately 2,627 acres of potential habitat and facility maintenance would result in the permanent conversion of 248 acres of habitat to industrial uses. Impacts include potential mortalities from vehicle traffic (short and long term), habitat fragmentation (long term), and increased potential for illegal collection. ACMs that would reduce potential impacts to gila monster include speed limit restrictions (ACM A.1.29), installation of perch discouraging devices (ACM A.5.58), and preconstruction surveys and notifications when individuals are moved from project disturbance areas (ACM A.5.38 and 39). In addition, mitigation measures ROW WL-19 (coordination with NDOW on conservation measures for Banded Gila monster), and ROW-WL-20 (Banded Gila monster surveys) have been added.

Mojave Poppy Bee: Incremental long-term reduction of approximately 1,718 acres of potential habitat would result from this alternative and facility maintenance would result in the permanent conversion of 120 acres of habitat to industrial uses. Impacts include potential mortalities from vehicle traffic (short and long term) and habitat fragmentation (long term). Potential impacts to this species would be minimized through implementation of a mitigation measures in vegetation ROW-VEG-3. No additional species-specific mitigation is proposed.

Residual impacts include:

- The same type of residual effects would occur except that habitat effects would be less than the Proposed Action.

3.6.2.5 Alignment Options 1 through 4

Table 3.6-9 compares the impacts associated with the alignment in the Proposed Action to the impacts associated with the Alignments Options 1 through 4. Mitigation measures and ACMs would apply to these alignment options.

Table 3.6-9 Potential Effects on Terrestrial Wildlife Resources from Implementation of Alignment Options 1 through 4

Alignment Option	Analysis
Alignment Option 1 (Humboldt-Toiybe Power Line Alignment). **Option Description**: Change the locations of a portion of the 230-kV power line from Gonder Substation near Ely to Spring Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Big game species ranges with reduced acreage impacts: mule deer crucial summer (-60 acres), antelope year round (-120 acres), elk year round (-96 acres), desert bighorn potential (-23 acres). Facility maintenance conversions reduced: mule deer crucial summer (-8 acres), antelope year round (-14 acres), elk year round (-2 acres), and desert bighorn potential (-3 acres). • Big game species ranges with increased acreage impacts: mule deer year round (75 acres), elk crucial summer (29 acres), rocky mountain bighorn sheep potential (38 acres). Facility maintenance conversions increased: mule deer year round (9 acres), elk crucial summer (4 acres), and rocky mountain bighorn sheep potential (58 acres). • Special status species for which there is no change: desert tortoise, gila monster, Mojave poppy bee. • Special status species with reduced construction/facility maintenance acreage impacts: pygmy rabbit (-16 acres /-1 acre), bats[1] (-2 acres /-105 acres / 0 to -13 acres), dark kangaroo mouse (-121 acres /-14 acres), greater sage-grouse [PPH (-96 acres /-11 acres), PGH (-29 acres /-4 acres), 3 fewer leks within 4 miles], golden eagle (-94 acres / -1 acres), ferruginous hawk (-77 acres /-9 acres), bald eagle (-55 acres /-6 acres), and western burrowing owl (-997 acres /-11 acres).
Alignment Option 2 (North Lake Valley Pipeline Alignment). **Option Description**: Change the locations of portions of the mainline pipeline and electrical transmission line in North Lake Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Big game species ranges with increased acreage impacts: mule deer year round (233 acres), antelope year round (294 acres), and elk year round (165 acres). Facility maintenance conversions increased: mule deer year round (42 acres), antelope year round (38 acres), and elk year round (24 acres). • Special status species for which there is no change: desert tortoise, gila monster, and Mojave poppy bee. • Special status species with reduced construction acreage impacts: pygmy rabbit (-189 acres), bats (-57 to -221 acres), dark kangaroo mouse (-168 acres), greater sage-grouse (PPH/PGH, -195/-145 acres), one fewer lek within 4 miles; golden eagle (-69 acres), and western burrowing owl (-81 acres). Facility maintenance conversions reduced: pygmy rabbit (-6 acres), bats[1] (+52 to -57 acres), dark kangaroo mouse (-5 acres), greater sage-grouse PGH (-63 acres), and golden eagle (-4 acres). • Special status species with increased construction acreage impacts: ferruginous hawk (32 acres), bald eagle (61 acres), bats (+52 to -57 acres). Facility maintenance conversions increased: bats[1] (-4 to +15 acres), greater sage-grouse PPH (60 acres), ferruginous hawk (13 acres), bald eagle (6 acres), and western burrowing owl (3 acres).
Alignment Option 3 (Muleshoe Substation and Power Line Alignment). **Option Description**: Eliminate the Gonder to Spring Valley transmission line, and construct a substation with an interconnection with an interstate, high voltage power line in Muleshole Valley.	• Big game species ranges with reduced acreage impacts: mule deer crucial summer (-60 acres), mule deer year round (-111 acres), antelope year round (-294 acres), elk year round (-387 acres), and desert bighorn potential (-3 acres). Facility maintenance conversions reduced: mule deer crucial summer (-8 acres), elk year round (-30 acres), and desert bighorn potential (-3 acres). • Big game species ranges with facility maintenance conversions increased: antelope year round (22 acres) and mule deer year round (35 acres). No construction acreage impact increased for any big game range. • Special status species for which there is no change: desert tortoise, gila monster, and Mojave poppy bee.

Table 3.6-9 Potential Effects on Terrestrial Wildlife Resources from Implementation of Alignment Options 1 through 4 (Continued)

Alignment Option	Analysis
Applicable To: Proposed Action and Alternatives A through C, E, and F.	• Special status species with reduced construction acreage impacts: pygmy rabbit (-15 acres), bats (-73 to -325 acres), greater sage-grouse PPH (-271 acres), PGH (-49 acres), 5 fewer active leks within 4 miles; golden eagle (-362 acres), ferruginous hawk (-290 acres), bald eagle (-332 acres) and western burrowing owl (-272 acres). Facility maintenance conversions reduced: greater sage-grouse PPH (-16 acres), and bald eagle (-22 acres). • Special status species with increased construction acreage impacts: dark kangaroo mouse (39 acres). Facility maintenance conversions increased: pygmy rabbit (25 acres), bats[1] (+18 to -8 acres), dark kangaroo mouse (21 acres), greater sage-grouse PGH (7 acres), golden eagle (13 acres), ferruginous hawk (9 acres), and western burrowing owl (24 acres).
Alignment Option 4 (North Delamar Valley Pipeline and Power Line Alignment). **Option Description**: Change the location of a short section of mainline pipeline in Delamar Valley to follow an existing transmission line. **Applicable To**: All alternatives.	• Big game species range with reduced acreage impacts: antelope year round (-53 acres). Facility maintenance conversion reduced: antelope year round (-45 acres). • Special status species for which there is no change: desert tortoise, greater sage-grouse (no change in PPH/PGH or number of active leks within 4 miles), gila monster, and Mojave poppy bee. • Special status species with reduced construction acreage impacts: bats (-53 to -176 acres), dark kangaroo mouse (-89 acres), golden eagle (-47 acres), bald eagle (-142 acres), and western burrowing owl (-45 acres). Facility maintenance conversions reduced: pygmy rabbit (-2 acres), bats[1] (-46 acres), dark kangaroo mouse (-42 acres), golden eagle (-45 acres), ferruginous hawk (-2 acres), bald eagle (-34 acres) and western burrowing owl (-45 acres). • Special status species with increased construction acreage impacts: pygmy rabbit (130 acres), ferruginous hawk (134 acres). Facility maintenance conversions increased: none.

[1] Two species, the long-cared myotis (with less habitat within the region of study) and the western pipistrelle (with more habitat within the region of study) were selected to provide a range of potential habitat impacts based on the difference in their SWReGAP modeled habitat.

3.6.2.6 No Action

Under the No Action Alternative, the proposed project would not be constructed or maintained. No project-related surface disturbance would occur. Impacts to terrestrial wildlife species and their habitat would continue at present levels as a result of natural conditions and existing and other proposed development within the project area. Habitat for terrestrial wildlife species would continue to be influenced by natural events such as drought and fire, land use activities such as grazing, recreational uses such as hunting, as well as reasonably foreseeable development actions. Wildlife species of management concern and special status wildlife species, depending on their status, would continue to be managed by the BLM, USFS, GBNP, or the states of Nevada or Utah, under the relevant plans (e.g., RMPs, recovery plans, and forest, park, or state management plans) that have been developed for their management as described earlier in this section.

3.6.2.7 Comparison of Alternatives

Table 3.6-10 compares Alternatives D, E, and F relative to the Proposed Action and Alternatives A through C.

Table 3.6-10 Comparison of Alternatives

Parameter	Proposed Action and Alternatives A through C		Alternative D Described or provided as a percent decrease from the Proposed Action		Alternatives E and F Described or provided as a percent decrease from the Proposed Action	
	Acres Construction	Acres Permanent	Acres Construction	Acres Permanent	Acres Construction	Acres Permanent
Qualitative Description	Proposed Action footprint		Reduced from the Proposed Action footprint and does not include any ROWs or ancillary facilities north of the White Pine county line, reducing surface impacts to wildlife in Spring Valley and removing surface impacts to wildlife in Snake valley.		Reduced from the Proposed Action footprint and does not include any ROWs or ancillary facilities in Snake Valley, avoiding surface impacts to wildlife from Snake Valley.	
Total habitat disturbance (acres)	12,288 acres	999 acres	8,828 acres	808 acres	10,681 acres	945 acres
Big Game Ranges (habitat):						
Mule Deer crucial summer	169	24	40	33	5	4
Mule Deer crucial winter	133	0	nearly 100	NA	nearly 100	NA
Mule Deer year round	3,917	363	25	17	9	10
Antelope year round	7,952	574	43	32	20	9
Rocky Mtn elk year round	4,019	282	33	36	Same as Proposed Action	Same as Proposed Action
Desert Bighorn (occupied)	259	11	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Desert Bighorn (potential)	25	3	No habitat impacts	No habitat impacts	Same as Proposed Action	Same as Proposed Action
Special Status Spp. (habitat)						
Desert tortoise	2,350	331	Same as Proposed Action for all three species.	Same as Proposed Action for all three species.	Same as Proposed Action for all three species.	Same as Proposed Action for all three species.
Gila monster	2,627	248				
Mojave poppy bee	1,718	120				
Special Status Spp. (habitat)						
Pygmy rabbit	3,634	235	23	15	9	no change
Bat species[1]	1,166 to 12,303	104 to 1,009	18 to 28	11 to 18	11 to 13	1 to 3
Dark kangaroo mouse[2]	7,732	557	35	28	15	6
Golden eagle	12,061	888	29	21	13	8

Table 3.6-10 Comparison of Alternatives (Continued)

Parameter	Proposed Action and Alternatives A through C		Alternative D Described or provided as a percent decrease from the Proposed Action		Alternatives E and F Described or provided as a percent decrease from the Proposed Action	
	Acres Construction	Acres Permanent	Acres Construction	Acres Permanent	Acres Construction	Acres Permanent
Ferruginous hawk (habitat)	5,173	331	39	33	16	16
Ferruginous hawk (nests)	Two known nests within 0.5 mile of ROW		No known nests within 0.5 mile of ROW		Two known nests within 0.5 mile of ROW	
Bald Eagle	5,571	442	25	19	12	7
Western burrowing owl	11,621	858	28	21	13	6
Greater sage-grouse leks	Active leks within 4 miles of ROW and ancillary facilities = 19. Active leks within 4 miles of overhead power lines = 19.		Active leks within 4 miles of ROW and ancillary facilities = 8. Active leks within 4 miles of overhead power lines = 8		Active leks within 4 miles of ROW and ancillary facilities = 18. Active leks within 4 miles of overhead power lines = 18.	
Greater sage-grouse Habitats:						
PPH	2,450	134	47	59	9	No change
PGH	2,497	153	55	36	34	18

[1] Two species, the long-eared myotis (less habitat within the region of study) and the western pipistrelle (more habitat within the region of study) were selected to provide a range of potential habitat impacts based on the difference in their SWReGAP modeled habitat.

[2] Based on SWReGAP modeled habitat.

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3.6.2.8 Groundwater Development and Groundwater Pumping

Issues

Groundwater Field Development Construction and Facility Maintenance

- Habitat loss and fragmentation from construction clearing of ROWs, transmission lines, and new and improved access roads.
- Direct disturbance and loss of individuals from construction activities along ROWs (including trenching), transmission lines, and access roads.
- Disturbance and loss of individuals from accidental wildfires and loss of habitat.
- Indirect effects, consisting of displacement of individuals and loss of breeding success, from exposure to construction or operational movements and noise and higher levels of human activity (including traffic).
- Potential disruption of migration patterns because of temporary fencing and potential entanglement and loss of individuals.
- Direct disturbance and loss of individuals from loss of habitat, and traffic mortality.
- Potential effects from collisions and electrocutions to raptors and other wildlife from power lines and power stations.
- Potential effects of additional infrastructure resulting in increased perches for raptors and corvids that may increase predation on other animals.
- Potential effects on terrestrial wildlife species culturally significant and traditionally used as food by regional Tribes.
- Compliance with recovery plans, conservation agreements, and state wildlife action plans for special status species.
- Potential effects of climate change on terrestrial wildlife resources. Refer to Section 3.1, Air and Atmospheric Values and Section 3.6.3.1 for a discussion of how climate change could contribute to groundwater development pumping effects on environmental resources.

Groundwater Pumping

- Short-term, long-term, and permanent loss of wildlife habitats used by wildlife from reductions in phreatophytic, wetland, riparian habitat, and surface water availability.
- Loss of individuals and displacement of wildlife species.
- Potential effects of groundwater drawdown on water resources and habitat that support migratory waterfowl, bats, and important bird areas.
- Potential effects of groundwater drawdown on wildlife that is associated with cave habitats.
- Compliance with recovery plans, conservation agreements, and state wildlife action plans for special status terrestrial wildlife species.
- Potential effects of climate change on terrestrial wildlife resources. Refer to Section 3.1, Air and Atmospheric Resources and Section 3.6.3.1 for a discussion of how climate change could contribute to groundwater development pumping effects on environmental resources.

Assumptions

Groundwater Field Development Construction and Facility Maintenance

- Identification of terrestrial wildlife that could be affected by project actions focused on species of management concern and special status wildlife species in groundwater development areas and drawdown areas.

- Construction disturbances, while temporary in nature, have been defined as long-term for all vegetation cover types due to existing vegetation structure and composition, recovery time frames, and limiting revegetation factors (e.g. low precipitation rates, soil chemistry constraints, and soil moisture).
- Identification of terrestrial wildlife habitat that could be affected by construction activities for groundwater development associated with the Proposed Action, Alternatives A, C, D, E, and F included all habitat within the exploration boundaries (groundwater development areas).
- Identification of terrestrial wildlife habitat that could be affected by construction activities for groundwater development associated with Alternative B included areas within 1 mile of the proposed Points of Diversion within the five groundwater development valleys.
- Application of the Ely and Las Vegas RMP management actions and best management practices to all proposed construction activities, based on the most current RMPs – Ely 2008 and Las Vegas 1998.
- Inclusion of the ACMs included in the SNWA POD to manage surface disturbance effects as a basis for appropriate measures that may be submitted in future SNWA ROW applications.

Groundwater Pumping

- The extent of groundwater drawdown effects on the terrestrial wildlife species is tied directly to drawdown impacts on springs, perennial streams, and vegetation plant communities as outlined in Sections 3.3, Water Resources, and 3.5, Vegetation Resources.
- Assumptions made in the vegetation section also apply to wildlife with regard to vegetation communities, see Section 3.5, Vegetation Resources.
- Assumptions made in the water section also apply to wildlife with regard to spring and perennial stream habitats, see Section 3.3, Water Resources.

Methodology

Groundwater Field Development Construction and Facility Maintenance

- The methods outlined under ROWs were applied to project surface development activities.
- Location of future facilities is unknown. For general discussions of terrestrial wildlife impacts it is assumed that the total estimated acreage for both construction and permanent facilities would impact wildlife habitat. A summary of these general project disturbance numbers is in Chapter 2, **Table 2.10-2**.
- Acreages of overlap between species habitat and groundwater development areas are provided for some species. However, the direct disturbance that is anticipated for construction of future facilities is limited to only a small portion of these acres. Impacts would occur where surface-disturbance activities occur, not within the entire groundwater development areas. Acres of habitat within groundwater development areas are provided in context of the percent of groundwater development area that is a particular type of habitat. It is calculated by using the acres of species habitat within the groundwater development areas divided by the total acreage of the groundwater development areas in each valley or summarized for all valleys. The intent is to provide the reader with a general sense of how feasible it will be to site future facilities outside of a particular species' habitat.
- If the acreage of proposed future facilities is less than the total amount of available habitat within the groundwater development areas, then impacts are conservatively estimated (more impacts to species habitat) to all be sited within that particular habitat and the full acreage of proposed future facilities is listed. If the acreage of proposed future facilities is more than the total amount of available habitat within the groundwater development areas, then impacts are conservatively estimated to be up to the total amount of available habitat.
- Indirect impacts, including construction noise, lighting, spread of noxious weeds, potential for wildfire, could also affect adjacent wildlife habitat. Impact discussions are considered general in terms of applicability to wildlife resources within the five basins and within these groundwater development area.
- Climate Change – Section 3.1, Air and Atmospheric Values and Section 3.6.3.1 discuss the potential effects of climate change on terrestrial wildlife resources. These effects could be in combination with the GWD Project

pumping. As a result of the current knowledge of climate change, it is not possible to relate potential effects with specific pumping alternatives that are analyzed in this EIS.

- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect wildlife resources from ROW construction and operation activities.
- Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

Groundwater Pumping

- To understand how the wildlife habitat impacts related to drawdown are described, the reader should review: 1) the Methodology, Assumptions, and Limitations discussion in Section 3.3, Water Resources; particularly the discussion under the unnumbered heading "Identification of Spring and Streams Susceptible to Drawdown Impacts", and 2) the Assumptions and Methods sections in 3.5, Vegetation Resources.
- The key habitat features (e.g. springs, perennial streams, phreatophytic vegetation communities) within species habitats were calculated (count, miles) and provided in percentage of the total of each features within the species habitat or within the basin to determine relative change in potential availability of those features to wildlife. The phreatophytic vegetation communities, wetland/meadow and basin shrubland, as defined in section 3.5.2.8 (Vegetation – Groundwater Development and Groundwater Pumping, Assumptions) are also used in this section.
- The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on terrestrial wildlife resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.
- As part of the COM Plan, the BLM will coordinate with the MOU partner agencies to define data gaps prior to initiating subsequent NEPA tiers. Several years of data collection may be required for terrestrial wildlife resources.

3.6.2.9 Proposed Action

Groundwater Development Areas

Construction and Facility Maintenance

Habitat Loss, Fragmentation, Accidental Wildfires, and Power Line Effects

The following information summarizes general habitat impacts to terrestrial wildlife resources in groundwater development areas, within the five groundwater development basins (Snake, Spring, Delamar, Dry Lake, and Cave valleys; there are no groundwater development areas in Utah). Construction of well pads, access roads, gathering pipelines, and electrical service lines would result in a total surface disturbance of approximately 3,590 to 8,410 acres. A portion of this construction disturbance – approximately 66 percent (or 2,374 to 5,536 acres) – would be permanently converted to industrial uses for the operational life of the project. No specific development plans are available as they cannot be prepared at this time. As a result, it is assumed that the habitat cover types would be affected in proportion to their relative surface area within the groundwater development areas. Consequently, it is expected that sagebrush shrubland, greasewood/saltbush shrubland, and Mojave mixed desert shrubland habitat types would be most extensively disturbed (**Table 3.5-9**, Vegetation Resources). The impacts of construction and facility maintenance on terrestrial wildlife in groundwater development areas would be similar to the impacts described in the ROW areas (Section 3.6.2.4.1) including impacts related to habitat fragmentation and potential impacts from accidental wildfires and power lines.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on terrestrial wildlife resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

As part of the COM Plan, ACMs and the BLM RMPs BMPs described for ROWs (**Appendix E**) also would be incorporated for the groundwater development areas, as applicable. Additional project-specific measures would be determined as part of subsequent NEPA analysis for specific project locations. As part of the programmatic level of analysis for this EIS, additional ACMs would be incorporated into future COM Plans and could include the following design features to reduce impacts to terrestrial wildlife resources. Other measures may be added during subsequent NEPA analyses.

In its Programmatic Measures, SNWA stated it will implement ACMs that may reduce potential impacts to terrestrial wildlife species. These may include, but are not limited to:

- Groundwater production well siting and design to reduce impacts (ACM B.1.1, B.1.4);
- Collector pipeline, distribution power line, and secondary substation siting (ACM B.1.3);
- Monitoring well design to use solar panels, to reduce need for additional power lines (ACM B.1.2); and
- Lighting limited and designed to reduce impacts (ACM B.2.4).

Surface restoration, restoration monitoring measures, and ACMs would be those identified in **Appendix E**.

Species of Management Concern

Big Game: Five big game species ranges (pronghorn antelope, Rocky Mountain elk, mule deer, Rocky Mountain bighorn sheep, and desert bighorn sheep) occur in at least one of the groundwater development basins. Species with the most widespread distribution are pronghorn antelope and mule deer. Crucial summer range is present for mule deer in four of the basins; crucial winter range is in Spring Valley for antelope and in Spring and Dry Lake valleys for mule deer (**Figures 3.6-1** to **3.6-5**). Antelope, elk, deer and bighorn sheep are all considered culturally significant to regional Tribes.

Table 3.6-11 summarizes acreage of big game ranges that fall within groundwater development areas for the Proposed Action. Refer to **Table 3.5-3** in Section 3.5, Vegetation Resources, for the acreages of the groundwater development areas in the five valleys.

Direct impacts to big game would include the incremental, long-term surface disturbance of approximately 3,590 to 8,410 acres of primarily shrubland wildlife habitat in groundwater development areas in the five basins. Of this, approximately 66 percent, or 2,374 to 5,536 acres of habitat would be permanently converted to industrial uses. This disturbance would cause the loss of potential forage. Herbaceous forage species might become established within 1 or 2 years, depending on reclamation success; other habitat types including shrubs and woodlands would take much longer (Vegetation Resources, **Table 3.5-9**). Although surface-disturbance activities would represent a long-term habitat loss for big game and the location of facilities within the groundwater development areas may impact local herds, these disturbance acres would represent a small percentage (less than 1 percent) of the overall available habitat within these areas. Other impacts to big game species would be the same as described in ROW impact discussion (Section 3.6.2.2).

The groundwater development areas overlap with approximately 9,269 acres of occupied desert bighorn sheep habitat in Delamar, Dry Lake, and Cave valleys and 7,801 acres of potential habitat in Spring, Dry Lake, and Cave valleys. Rocky Mountain bighorn sheep occupied and potential habitat overlaps groundwater development areas in Snake and Spring valleys including approximately 6,664 acres of occupied habitat and 5,069 acres of potential habitat (**Table 3.6-12**). Potential impacts to desert bighorn and Rocky Mountain bighorn sheep as a result of construction and maintenance of groundwater development facilities would be the same as those described in the ROW impact discussion for desert bighorn sheep (Section 3.6.2.2).

Table 3.6-11 Big Game Range Acreage Overlap with Proposed Action Groundwater Development Areas

Habitat	County	Basin	Pronghorn	Rocky Mountain Elk	Mule Deer
Crucial Summer	Lincoln	Cave Valley	NI	0	2,884
		Dry Lake Valley	NI	0	800
		Spring Valley	NI	0	1,461
	Lincoln Total		NI	0	5,145
	White Pine	Snake Valley	NI	0	11,282
		Spring Valley	NI	0	366
	White Pine Total		NI	0	11,648
Crucial Summer Total			**NI**	**0**	**16,793**
Crucial Winter	Lincoln	Dry Lake Valley	0	NI	27,533
		Spring Valley	0	NI	4,672
	Lincoln Total		0	NI	32,205
	White Pine	Spring Valley	24,813	NI	26,154
	White Pine Total		24,813	NI	26,154
Crucial Winter Total			**24,813**	**NI**	**58,359**
Year Round	Lincoln	Cave Valley	32,319	34,787	31,887
		Delamar Valley	61,896	0	3,196
		Dry Lake Valley	121,659	41,346	50,465
		Spring Valley	54,645	12,843	8,738
	Lincoln Total		270,519	88,976	94,286
	White Pine	Snake Valley	90,163	3,121	22,237
		Spring Valley	288,604	103,030	86,156
	White Pine Total		378,767	106,151	108,393
Year Round Total			**649,286**	**195,127**	**202,679**

NI: None Identified.

NOTE: As described in the methodology section, acreages of overlap between species habitat and groundwater development areas are provided however, the direct disturbance that is anticipated for construction of future facilities is limited to only a small portion of these acres. Impacts would occur where surface-disturbance activities occur, not within the entire groundwater development areas.

Table 3.6-12 Bighorn Sheep Range Acreage Overlap with Proposed Action and Alternatives A and C Groundwater Development Areas

Basin	Desert Bighorn Sheep		Rocky Mountain Bighorn Sheep	
	Occupied	Potential	Occupied	Potential
Cave	3,680	500	0	0
Delamar	703	0	0	0
Dry Lake	4,886	2,879	0	0
Snake	0	0	3,079	229
Spring	0	4,422	3,585	4,840
Total	**9,269**	**7,801**	**6,664**	**5,069**

NOTE: As described in the methodology section, acreages of overlap between species habitat and groundwater development areas are provided however, the direct disturbance that is anticipated for construction of future facilities is limited to only a small portion of these acres. Impacts would occur where surface-disturbance activities occur, not within the entire groundwater development areas.

Protections provided by the RMPs and ACMs would reduce impacts to big game.

Habitat Impact by Basin:

Cave Valley: More than 90 percent of the groundwater development area in Cave Valley is antelope, elk, and mule deer year-round habitat ranges. (See **Figure 1.1-1** for groundwater development areas and valleys, **Figures 3.6-1** through **3.6-5** for big game habitats, and **Appendix F**, **Table F3.6-4**). Future facilities built in groundwater development exploratory areas would impact these big game habitats because these habitats could not be completely avoided through siting decisions. Eight percent of the groundwater development area is mule deer crucial summer range and 11 percent is desert bighorn sheep occupied habitat. Given the more limited extent of these big game ranges within the exploratory area in Cave Valley, facility siting decisions could avoid these habitats.

Delamar Valley: Eighty-six percent of the groundwater development area in Delamar Valley is antelope year-round habitat. Four percent is mule deer year round habitat and 1 percent is occupied desert bighorn sheep occupied habitat. In this valley it would be difficult to site future facilities without impacting antelope year round habitat, but other big game ranges could be avoided. There is no crucial seasonal range for mule deer in this valley, no crucial winter for antelope, and no crucial summer for elk.

Dry Lake Valley: Seventy-two percent of the groundwater development area in Dry Lake Valley is antelope year-round range. Thirty percent is mule deer year round range and 24 percent is elk year round. These ranges would likely be impacted by future project facilities. As only 16 percent of the groundwater development area is mule deer crucial winter range and 3 and 2 percent are occupied and potential desert bighorn sheep range, respectively, facility siting decisions could avoid bighorn sheep habitat entirely and should make every effort to avoid mule deer crucial winter range.

Spring Valley: Ninety-five percent of the groundwater development areas in Spring Valley are antelope year-round range. Thirty-two percent is elk year round and 26 percent is mule deer year round range. Nine percent is mule deer crucial winter range and 7 percent is antelope crucial winter range. Since only 1 percent of the development areas in Spring Valley are mule deer crucial summer range, potential desert bighorn sheep, and occupied and potential rocky mountain bighorn sheep ranges, these could likely be avoided through facility siting decisions.

Snake Valley: Ninety-seven percent of the groundwater development areas in Snake Valley is antelope year-round range. Facilities would impact this range type because it would be difficult to site facilities to avoid this range type. Twenty-four percent is mule deer year round habitat and 12 percent is mule deer crucial summer range. Three percent of the areas are elk year-round and Rocky Mountain bighorn sheep occupied habitats, which could be avoided through facility siting decisions.

Big Game Conclusion. Habitat for big game would temporarily be disturbed by construction (approximately 3,590 to 8,410 acres) and a portion would be permanently converted to industrial uses (approximately 2,374 to 5,536 acres) with potential for impact described above by basin. Construction and facility maintenance impacts would also include displacement of individuals, potential loss of breeding success, exposure to construction/maintenance movements and noise, and higher levels of human activities (including potential increased mortality from traffic and illegal poaching). The area of habitat affected by construction surface disturbance would represent less than 1 percent of the surface area of these habitat ranges within these basins; however, the location of facility construction or maintenance could impact local herds and migration corridors. Protections provided by the RMPs and ACMs would reduce impacts to big game.

Mitigation Recommendations:

GW-WL-1: Avoid Siting Facilities in Key Big Game Habitats. Avoid locating wells, new roads, or other linear facilities within key big game habitats including crucial summer and winter ranges, and occupied bighorn sheep habitats. Where avoidance is not practicable, the SNWA would improve 2 acres of comparable habitat for every 1 acre disturbed. Effectiveness: This measure would be effective in that it would first avoid locating facilities in key habitats, and if unavoidable, improve habitat thus increasing the carrying capacity of the comparable big game habitat.

Potential residual impacts include:

- The long-term (20 to 200 years) restoration periods for shrublands and woodlands in big game ranges disturbed by GWD facility construction make these habitats less suitable for forage and cover and contribute to habitat fragmentation.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.
- Potential big game mortalities may result from vehicle collisions.

Other Terrestrial Wildlife Species of Management Concern

Direct disturbance to small mammals, reptiles, game, and other bird species of management concern (including raptors) from surface-disturbing activities include the incremental, long-term surface disturbance of approximately 3,590 to 8,410 acres of habitat in Snake, Spring, Delamar, Dry Lake, and Cave valleys (**Table 3.5-9**, Vegetation Resources, for land cover types within the groundwater development areas). Terrestrial wildlife species of management concern habitat requirements are described in **Appendix F**, **Table F3.6-2**. Approximately 66 percent of the construction surface disturbance, or 2,374 to 5,536 acres would be permanently converted to industrial uses, and would not be reclaimed during the project life. Direct and indirect impacts to small mammal, reptiles, game, and other bird species of management concern (including raptors) as a result of construction and facility maintenance in groundwater development areas are anticipated to be similar to those described in ROWs, including general habitat fragmentation and potential for accidental wildfires and power line impacts. Culturally significant species in this group of wildlife include rabbits and various species of raptors.

While no important bird areas overlap with groundwater development areas, GBNP and D.E. Moore Bird and Wildlife Sanctuary important bird areas share a boundary with a groundwater development area in Snake Valley and the Northern Snake Range important bird area is within 2 miles of groundwater development areas in Snake and Spring valleys. Construction of facilities in the groundwater development areas, if near the boundary of the area, could have impacts to wildlife in these important bird areas, from indirect effects of noise and dust.

In its Programmatic Measures, the SNWA has stated it will implement ACMs that may reduce potential impacts to wildlife species. These are mentioned at the beginning of the groundwater development section and available in **Appendix E**.

Conclusion. Construction of well pads, gathering pipelines, and electrical service lines would disturb approximately 3,590 to 8,410 acres of primarily shrubland wildlife habitat in the five groundwater basins. Of this disturbance, approximately 66 percent (2,374 to 5,536 acres) would be permanently converted to industrial uses. Increased mortalities could occur given construction and facilities maintenance activities and timing of activities could impact migratory bird species and other species breeding. Habitat fragmentation effects would incrementally contribute to impacts to species, but for species requiring large tracts of unbroken habitat such as sagebrush obligates, species may not be able to complete their life functions and this project may contribute to general population declines. Protections provided by the RMPs and the ACMs would reduce impacts. See the corresponding section under ROW areas for relevant RMP protections and ACM numbers.

Mitigation Recommendations:

Given the importance of MBTA protections and raptor nest avoidance, additional mitigation recommendations for construction of groundwater development facilities include ROW-WL-2: USFWS Concurrence on Plans and ROW-WL-3: Raptor Nest Survey and Avoidance.

Measures proposed in Section 3.7, Aquatic Biology Resources, section would also benefit other species of management concern. GW-AB-1 (Avoid Disturbance to Springs and Wetlands) and GW-AB-2 (Avoid Disturbance to Streams) would also reduce impacts to terrestrial wildlife species by avoiding or minimizing impacts to aquatic habitat and adjacent wetland and riparian habitats used by many terrestrial wildlife species.

Potential residual impats include:

- The long-term (20 to 200 years) restoration periods for shrubland and woodland habitats disturbed by GWD facility construction would make these habitats unavailable for nesting, forage, and cover for other management concern species and contribute to habitat fragmentation.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.

Special Status Species

The focus of the impact analysis was on the following BLM Sensitive Species: pygmy rabbit, bats, dark kangaroo mouse, greater sage-grouse, special status raptors, western burrowing owl, additional special status birds, and Baking Powder Flat blue butterfly. Other special status birds are addressed as a group. Impacts for each species or species group would be qualitatively the same as described for the ROW impacts on special status species (Section 3.6.2.4). Although acreages of overlap between species habitat and groundwater development areas are provided for some species, the direct disturbance that is anticipated for future facilities is limited to approximately 3,590 to 8,410 acres from construction, of which, approximately 66 percent (2,374 to 5,536 acres) would be permanently converted to industrial uses.

Desert Bighorn Sheep: Habitat is discussed under the species of management concern.

Greater Sage-grouse: Construction of facilities in the groundwater development areas could affect greater sage-grouse leks as well as PPH and PGH (BLM 2012b). The number of leks inside groundwater development areas is listed in **Table 3.6-13**, the number of leks within 4 miles of groundwater development areas are shown in **Table 3.6-14** and the estimated number of acres of greater sage-grouse habitat that overlap the groundwater development areas is provided in **Table 3.6-15**. Sage-grouse is considered culturally significant to regional Tribes.

Table 3.6-13 Summary of Greater Sage-grouse Active, Inactive, and Historic Lek Locations within Proposed Groundwater Development Areas

Valley	Population Management Unit	Active	Inactive	Historic	Unknown	Total # of Leks
Cave Valley	Cave	1	0	0	0	1
Snake Valley	Spring/Snake Valley	1	0	2	0	3
Spring Valley - White Pine, Lincoln	Lincoln	2	2	0	0	4
Spring Valley - White Pine, Lincoln	Schell/Antelope	0	1	0	1	2
Spring Valley - White Pine, Lincoln	Spring/Snake Valley	9	1	1	6	17
Total		**13**	**4**	**3**	**7**	**27**

Table 3.6-14 Summary of Greater Sage-grouse Active, Inactive, and Historic Lek Locations within 4 Miles of Proposed Groundwater Development Areas[1]

Valley	Population Management Unit	Active	Inactive	Historic	Unknown	Total # of Leks
Cave Valley	Cave	7	0	0	0	7
Dry Lake Valley	Lincoln	0	2	0	0	2
Lake Valley – White Pine	Lincoln	1	0	0	0	1
Snake Valley	Spring/Snake Valley	1	1	3	0	5
Spring Valley - White Pine, Lincoln	Lincoln	2	2	0	1	5
Spring Valley - White Pine, Lincoln	Schell/Antelope	0	1	0	1	2
Spring Valley - White Pine, Lincoln	Spring/Snake Valley	9	1	1	6	17
Total		**20**	**7**	**4**	**8**	**39**

[1] These include leks inside the groundwater development areas as well as those within 4 miles.

Table 3.6-15 Acres within and Percent of Groundwater Development Areas for Greater Sage-grouse Habitat by Valley

Basin	Acres of PPH within Groundwater Development Areas	Percent of Groundwater Development Areas that is PPH (%)	Acres of PGH within Groundwater Development Areas	Percent of Groundwater Development Areas that is PGH (%)	Total Acres of Groundwater Development Area in Valley
Cave	21,621	62	922	3	34,787
Dry Lake	0	0	42,194	25	168,769
Snake	2,071	2	23,707	26	92,703
Spring	142,406	39	57,056	16	361,795
Total	**166,098**	**25**	**123,879**	**19**	**658,054**

NOTE: As described in the methodology section, acreages of overlap between species habitat and groundwater development areas are provided however, the direct disturbance that is anticipated for construction of future facilities is limited to only a small portion of these acres. Impacts would occur where surface-disturbance activities occur, not within the entire groundwater development areas.

Direct impacts would include the long-term reduction of up to approximately 2,633 to 6,339 acres of habitat within 4 of the groundwater development basins (Cave, Dry Lake, Snake, and Spring valleys). This would result in the incremental reduction in the amount of available habitat for this species until reclamation activities are completed and native vegetation is reestablished. Sixty-six percent of the construction surface disturbance or 1,747 to 4,180 acres of habitat would be permanently converted to industrial uses for the life of the proposed project. **Table 3.6-15** shows the percent of groundwater development areas that is PPH or PGH. Given the amount of the various seasonal habitats within Cave, Snake, and Spring valleys, it would be difficult to site facilities without impacting these habitats (also see **Appendix F, Table F3.6-4**). Further, given the number of leks that fall within groundwater development areas as well as within 4 miles of groundwater development areas, facility siting with regard to active sage-grouse leks would be of particular importance. While ACMs may reduce the potential for impacts to sage-grouse leks by siting as much as possible to limit disturbance in priority sage grouse habitat, be within designated utility corridors, and be co-located along existing ROWs including power lines and roads, impacts including potential increased collision and predation (particularly when power lines are located east of leks within line-of-sight) as well as habitat avoidance could occur as a result of overhead power lines. Other impacts to greater sage-grouse would be the same as described in the ROW section.

In its Programmatic Measures, SNWA has stated it will implement ACMs that may reduce potential impacts to wildlife species (for more detail see **Appendix E**). These may include, but are not limited to:

- Groundwater production well siting and design to reduce impacts (ACM B.1.1, B.1.4);
- Collector pipeline, distribution power line, and secondary substation siting (ACM B.1.3);
- Monitoring well design to use solar panels, to reduce need for additional power lines (ACM B.1.2);
- Lighting limited and designed to reduce impacts (ACM B.2.4); and
- Siting groundwater production wells and overhead power lines at least 0.25 mile away from an active greater sage-grouse lek and routing underground pipelines to be at least 0.25 mile away from active leks, unless placed within an existing road and not constructed during the breeding season (ACM B.5.1).

Conclusion. Construction would result in the incremental, long-term reduction of up to approximately 2,633 to 6,339 acres of habitat within 4 of the groundwater development basins (Cave, Dry Lake, Snake, and Spring valleys). Of this disturbance, approximately 1,747 to 4,180 acres of habitat would be permanently converted to industrial uses. Other impacts would include animal displacement (short and long term), habitat fragmentation (long term), increased potential mortalities from vehicle traffic (short and long-term), potential loss of nests, eggs or young, and potential for increased collisions and predation given additional perching sites on power lines. There are 13 active leks within proposed groundwater development areas and 39 active leks within 4 miles. All 7 of the active leks in southern Cave Valley are within 4 miles of groundwater development areas. All 10 of the active leks in Spring/Snake population management unit fall within groundwater development areas in Spring and Snake valleys and an additional 2 active leks in southern Spring Valley are also within proposed Spring Valley groundwater development areas. Protections provided by the RMP and the ACMs would reduce impacts, but potential for long term impacts to local greater sage-grouse populations exists. See ACMs listed above and the corresponding section under ROW areas for relevant RMP protections and ACM numbers.

Mitigation Recommendations:

Given the importance of avoiding line-of-sight views of active leks, additional mitigation recommendations for construction of groundwater development facilities include GW-WL-2. Mitigation measures as outlined in the ROW section including ROW-WL-6: Habitat restoration to benefit greater sage-grouse for permanently converted habitat, ROW-WL-7: Habitat restoration to benefit greater sage-grouse for other disturbed habitat, ROW-WL-8: Greater sage-grouse monitoring, ROW-WL-9: Greater sage-grouse timing restriction breeding, nesting and early brood rearing, ROW-WL-10: Greater sage-grouse timing restriction winter range, ROW-WL-11: Fence marking for greater sage-grouse, and ROW-WL-12: Co-location of power lines are also recommended.

GW-WL-2: Avoid Siting Facilities Within Buffers of Active Sage-grouse Leks. The SNWA would avoid siting facilities within 4 miles of active sage-grouse leks. Where avoidance is not possible, all power lines 33 kV or smaller within 4 miles of active greater sage-grouse leks must be buried. If technology at the time of construction allows, lines greater than 33 kV would also be buried. Effectiveness: This measure would be effective in avoiding power line associated impacts to active sage-grouse leks.

Potential residual impacts include:

- The long-term (20 to 50 years) restoration periods for sagebrush shrubland habitats disturbed by GWD facility construction make these habitats less suitable for forage and cover for greater sage-grouse.
- An unknown portion of habitats may be degraded because recovery did not fully occur or proximity to permanent facilities makes the habitat less suitable.

Raptor Species: Direct impacts to raptor species would include the long-term reduction of an estimated 3,590 to 8,410 acres of foraging and nesting habitat in the 5 basins. This would result in a reduction in the amount of available foraging and nesting habitat for golden eagles, ferruginous hawks, northern goshawks, peregrine falcons, and prairie falcons and foraging habitat for bald eagles within the five groundwater development basins until reclamation activities

are completed and native vegetation is reestablished. Sixty-seven percent of the construction surface disturbance, or 2,374 to 5,536 acres would be permanently converted to industrial uses for the life of the proposed project. Other impacts to raptors would be the same as described in the ROW section.

Conclusion. Construction would result in the incremental, long-term reduction of up to an estimated 3,590 to 8,410 acres of raptor foraging and nesting habitat. Of this, approximately 66 percent (2,374 to 5,536 acres) would be permanently converted to industrial uses. Other impacts would include animal displacement (short and long term), habitat fragmentation (long term), increased potential nesting and roosting disruption from vehicle traffic (short and long-term), and potential loss of nests, eggs, or young. Protections provided by the RMP and ACMs would reduce impacts. See the corresponding section under ROW Areas for relevant RMP protections and ACM numbers.

Mitigation Recommendations:

Given the importance of raptor nest avoidance, additional mitigation recommendations for construction of groundwater development facilities include ROW-WL-2: USFWS Concurrence on Plans and ROW-WL-3: Raptor Nest Survey and Avoidance.

Mitigation measure GW-WL-3 protects burrowing owls by requiring pre-construction surveys.

Potential residual impacts include:

- The long-term (20 to 200 years) restoration periods for shrubland and woodland habitats disturbed by GWD facility construction would make these habitats unavailable for nesting, forage, and cover for other management concern species and contribute to habitat fragmentation.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.

Western Burrowing Owl: Direct impacts to western burrowing owl would include the long-term reduction of up to approximately 3,590 to 8,410 acres of owl habitat in the 5 groundwater development basins until reclamation activities are completed and native vegetation is reestablished. Approximately 66 percent of the construction surface disturbance, or 2,374 to 5,536 acres, would be permanently converted to industrial uses for the life of the proposed project. Other impacts to western burrowing owl would be the same as described in the ROW section. Based on the SWreGap habitat model for burrowing owl, 99 percent of the groundwater development area in Delamar Valley is burrowing owl habitat. The groundwater development areas in Cave, Dry Lake, Snake, and Spring valleys are 68, 88, 86, and 88 percent burrowing owl habitat, respectively (**Appendix F**, **Table F3.6-4**). As such, siting facilities to avoid burrowing owl habitat may be difficult.

Conclusion. Construction would result in the incremental, long-term reduction of up to approximately 3,590 to 8,410 acres of nesting and foraging habitat for burrowing owl. Of this, approximately 66 percent (2,374 to 5,536 acres) would be permanently converted to industrial uses. Other impacts to burrowing owls would include potential mortalities from vehicle traffic (short term and long term), as well as impacts similar to other raptor species listed above. Protections provided by the RMP and the ACMs would reduce impacts. See the corresponding section under ROW areas for relevant RMP protections and ACM numbers. Additional recommended mitigation measures would include pre-construction surveys, well siting avoidance of western burrowing owl burrows, and other facility siting avoidance of burrows to the extent practicable with applicant-proposed mitigation for burrows that were not avoided.

Mitigation Recommendations:

Given the importance of burrows for western burrowing owl, additional mitigation recommendations for construction of groundwater development facilities include GW-WL-3.

GW-WL-3: Pre-construction Surveys and Avoidance of Active Burrowing Owl Burrows. Prior to siting future facilities, SNWA would conduct pre-construction surveys for burrowing owl based on habitat, known range, and previous occurrences within areas being considered for facilities. Well and other facility siting would avoid active

burrows during breeding and nesting season to the extent practicable. Effectiveness: This measure would be effective in avoiding impacts to active burrowing owl burrows.

Potential residual impacts include:

- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.

Additional Special Status Bird Species: Direct impacts to other special status bird species would include the long-term reduction of up to approximately 3,590 to 8,410 acres of nesting and foraging habitat in the 5 groundwater development basins until reclamation activities are completed and native vegetation is reestablished. Approximately 66 percent of the construction surface disturbance (2,374 to 5,536 acres) would be permanently converted to industrial uses for the life of the proposed project. Potential impacts from future groundwater development could impact foraging, courtship, breeding, or nesting success of these species that occur within groundwater development areas. A list of species is provided in **Appendix F**, **Table F3.6-1**. Other impacts to special status birds would be the same as described in the ROW section.

Conclusion. Construction would result in the incremental long-term reduction of up to approximately 3,590 to 8,410 acres of nesting and foraging habitat for additional special status birds. Of this, approximately 2,374 to 5,536 acres would be permanently converted to industrial uses for the life of the proposed project. Native shrubland and woodland habitat would likely be removed or disturbed by construction and would require 20 to more than 200 years for recovery to similar species composition and vertical structure as adjacent undisturbed areas. Annual and perennial grassland, and marshland habitats would require from 2 to 20 years for recovery. Increased mortalities could occur given construction and facilities maintenance activities and timing of activities could impact breeding of migratory bird species. Fragmentation effects would incrementally contribute to impacts to species. Protections provided by the RMP and the ACMs would reduce impacts. See the corresponding section under ROW areas for relevant RMP protections and ACM numbers.

Mitigation Recommendations:

Given the importance of protecting active MBTA bird nests, additional mitigation recommendations for construction of groundwater development facilities include ROW-WL-2: USFWS Concurrence on Plans and ROW-WL-3: Raptor Nest Survey and Avoidance.

Potential residual impacts include:

- The long-term (20 to 200 years) restoration periods for shrubland and woodland habitats disturbed by GWD facility construction would make these habitats unavailable for nesting, forage, and cover for other management concern species and contribute to habitat fragmentation.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.

Pygmy Rabbit: Based on the SWReGap habitat model for pygmy rabbits, 52 percent of the groundwater development area in Cave Valley is modeled pygmy rabbit habitat; 35 percent of the groundwater development areas in Dry Lake Valley; 39 percent of the groundwater development areas in Spring Valley and 7 percent of the groundwater development areas in Snake Valley are modeled pygmy rabbit habitat (**Appendix F**, **Table F3.6-4**). Particularly in Dry Lake and Spring valleys it could be difficult to avoid impacting pygmy rabbit habitat. Direct impacts would include the long-term reduction of up to approximately 2,633 to 6,339 acres of habitat within the 4 groundwater development valleys (there is SWReGAP modeled habitat in Delamar Valley; however, there are no records of the species there). Approximately 66 percent of the construction surface disturbance or 1,747 to 4,180 acres of habitat would be permanently converted to industrial uses. This would result in the incremental reduction in the amount of available habitat for this species until reclamation activities are completed and native vegetation is reestablished. Other impacts to pygmy rabbit would be the same as described in the ROW section.

Conclusion. Construction would result in the incremental, long-term reduction of up to approximately 2,633 to 6,339 acres of habitat. Of this, approximately 66 percent (1,747 to 4,180 acres) of habitat (shrub-scrub) would be permanently converted to industrial uses. Impacts would include displacement of animals due to noise and human activity (short and long term), habitat fragmentation (long term), potential for direct mortality from crushing of individuals or burrows by vehicles or equipment (long term), as well as potential for increased predation given additional perching sites on power lines (long term). Protections provided by the RMP and the ACMs would reduce impacts. See the corresponding section under ROW areas for relevant RMP protections and ACM numbers.

Mitigation Recommendations:

Given the importance of active burrows, additional mitigation recommendations for construction of groundwater development facilities include GW-WL-4. Mitigation measures as outlined in the ROW section including ROW-WL-14: Pygmy rabbit surveys and passive relocation, ROW-WL-15: Pygmy rabbit habitat improvement, ROW-WL-16: Priority reclamation efforts in pygmy rabbit habitat, and ROW-WL-17: Unanticipated nesting pygmy rabbits are also are recommended.

GW-WL-4: Pre-construction Survey and Avoidance of Pygmy Rabbit Occupied Habitat. Prior to siting future facilities, the SNWA would conduct pre-construction surveys for pygmy rabbits based on habitat, known range, and previous occurrences within areas being considered for facilities. Well and other facility siting would avoid occupied habitat to the extent practicable. Effectiveness: This measure would be effective in avoiding impacts to pygmy rabbits.

Potential residual impacts include:

- The long-term (20 to 50 years) restoration period for sagebrush shrubland habitat disturbed by GWD facility construction makes this habitat unavailable for forage and cover for pygmy rabbit and contributes to habitat fragmentation.
- An unknown portion of habitat may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.

Bats: Direct impacts to special status bat species would include the long-term reduction of up to approximately 3,590 to 8,410 acres of foraging habitat. For species that use more specialized habitat these acres would likely be lower. This would result in an incremental reduction in the amount of available habitat for these species until reclamation activities are completed and native vegetation is reestablished. Approximately 66 percent of the construction surface disturbance or up to approximately 2,374 to 5,536 acres would be permanently converted to industrial uses within the 5 groundwater development basins. Based on the SWReGap model for western pipistrelle, 100 percent of the groundwater development areas in all 5 basins is potential foraging habitat. For long-eared myotis the percent of the groundwater development areas that is habitat for the species ranges from 7 percent in Spring Valley to 33 percent in Delamar Valley (**Appendix F**, **Table F3.6-4**); thus facility siting will impact habitat for more generalist bat species, but it may be possible to avoid habitat for habitat specialists. Other impacts to bat species would be the same as described in the ROW section.

Conclusion. Construction would result in the incremental, long-term reduction of up to approximately 3,590 to 8,410 acres of bat foraging habitat. Of this, approximately 66 percent (up to 2,374 to 5,536 acres) would be permanently converted to industrial uses. Other impacts could include: loss of roosting sites for tree-roosting species; displacement of animals due to noise and human activity (short and long term); and habitat fragmentation (long term). There also may be increased mortality to bats from potential power line collisions (long term). Protections provided by the RMP and the ACMs would reduce impacts. See the corresponding section under ROW Areas for relevant RMP protections and ACM numbers.

Mitigation Recommendations:

GW-WR-5: Spring Avoidance, **GW-WR-6: Avoid Perennial Streams**, **GW-AB-1: Avoid Direct Impacts to Springs and Wetlands**, and **GW-AB-2: Avoid Locating Facilities Within 0.5 Mile of or Parallel to Perennial**

Streams and Riparian Areas. These mitigations would also reduce impacts to bat species by avoiding or minimizing impacts to these important foraging habitats.

Potential residual impacts include:

- The long-term (20 to 200 years) restoration periods for woodland habitats disturbed by GWD facilities construction make this habitat unavailable for forage and roosting for bats.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.

Dark Kangaroo Mouse: Direct impacts to dark kangaroo mouse would include the long-term reduction of habitat due to construction and potential for permanent conversion of habitat within Cave, Dry Lake, and Spring valleys (NDOW 2010a) and possibly in Delamar and Snake (USGS 2007). Using SWReGAP dark kangaroo mouse modeled habitat, up to 575 to 1,652 acres of habitat in Cave Valley, up to 395 to 834 acres of habitat in Dry Lake Valley, up to 1,206 to 2,853 acres in Spring Valley, could be disturbed during construction. Habitat in Snake and Delamar valleys might include an additional 1,407 to 3,056 acres. Of this, approximately 66 percent of the construction surface disturbance would be permanently converted to industrial uses within these basins. Based on the SWreGap model for the species (dark kangaroo mouse) 76 percent of the groundwater development area in Dry Lake Valley is dark kangaroo mouse habitat, for the other valleys see **Appendix F**, **Table F3.6-4**; thus facility siting may impact habitat for this species. Other impacts to dark kangaroo mouse would be the same as described in the ROW section.

Conclusion. Construction would result in the incremental, long-term reduction of habitat. A portion of this surface disturbance acreage (66 percent) would be permanently converted to industrial uses. Other impacts would include potential mortalities from vehicle traffic (short and long-term), and habitat fragmentation (long term). ACMs would reduce impacts to this species. See the corresponding section under ROW Areas for relevant ACM numbers.

Mitigation Recommendations:

Additional mitigation recommendations for construction of groundwater development facilities include ROW-WL-18 (Coordination with NDOW on conservation measures for dark kangaroo mouse) and GW-WL-5 (pre-construction survey and avoidance of dark kangaroo mouse occurrences).

GW-WL-5: Pre-construction Survey and Avoidance of Dark Kangaroo Mouse Occurrences. Prior to siting future facilities, the SNWA would conduct pre-construction surveys for dark kangaroo mouse based on habitat, known range, and previous occurrences within areas being considered for facilities. Well and other facility siting would avoid occurrences to the extent practicable. Where impacts cannot be avoided, measures similar to those proposed by the applicant for ROW construction would be followed. Effectiveness**:** This measure would be effective in avoiding impacts to dark kangaroo mouse.

Potential residual impacts include:

- The long-term (20 to 200 years) restoration periods for shrublands and woodlands in habitats disturbed by GWD facility construction make these habitats unavailable for forage and cover for dark kangaroo mouse.
- An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.
- Potential mortalities may occur to dark kangaroo mouse from construction equipment and soil movement.

Baking Powder Flat Blue Butterfly: Given the presence of Baking Powder Flat Blue Butterfly within a groundwater development area (Spring Valley), potential impact could include the direct mortality to the species (adult) from construction or vehicle traffic, disruption of breeding success (displacement) or direct mortality of adults, larvae, or eggs if host plants are impacted, and temporary or permanent loss of habitat if facilities are sited within occupied habitat.

Conclusion. Construction could result in the incremental long-term reduction of habitat and facility maintenance could result in the permanent conversion of habitat to industrial uses. Impacts include potential mortalities from vehicle traffic (short and long term), habitat fragmentation (long term), or direct mortality of adults, larvae, or eggs if host plants are impacted. Requirements for reclamation, as provided for in the RMP, would reduce impacts.

Mitigation Recommendations:

Given the importance of the currently known location of the butterfly and the host plant in the known occurrence area, additional mitigation recommendations for construction of groundwater development facilities include GW-WL-6 and GW-WL-7.

GW-WL-6: Avoid Siting Facilities within the Baking Powder Flat ACEC. The SNWA would avoid siting groundwater development facilities within the Baking Powder Flat ACEC. Effectiveness: This measure would be effective in avoiding impacts to the baking powder flat blue butterfly and its habitat within the ACEC.

GW-WL-7: Pre-construction Surveys and Avoidance of Baking Powder Flat Blue Butterfly Occurrences and Habitat. Prior to siting future facilities, SNWA would conduct pre-construction surveys for Baking Powder Flat blue butterfly based on habitat, known range, and previous occurrences within areas being considered for facilities. Well and other facility siting would avoid occurrences and habitat. Effectiveness: This measure would be effective in avoiding impacts to occurrences of this species of butterfly.

Potential residual impacts include:

An unknown portion of habitats may be degraded because recovery may not fully occur or proximity to permanent facilities makes the habitat less suitable.

Groundwater Pumping

Pumping Effects General Terrestrial Wildlife Discussion

This section focuses on the potentially long-term, indirect impacts to wildlife species due to a potential reduction in groundwater dependent habitats (i.e. spring, perennial streams, riparian areas below springs and along stream channels with perennial flows, and phreatophytic wetland/meadow and phreatophytic basin shrubland vegetation types).

A change in groundwater level would potentially reduce the water availability in perennial streams and springs as well as to associated vegetation communities (e.g. wetlands, riparian areas, wet meadows) and groundwater dependent phreatophytes vegetation communities. The potential loss or reduction in available water as a result of water level change could result in long-term changes in these wildlife habitats where the water sources are hydraulically connected to pumped areas.

The habitat associated with naturally occurring springs, seeps, and perennial stream reaches and associated perennial pools encompass riparian vegetation (both woody and herbaceous plant species), wetland areas, mesic habitats (wet meadows), and groundwater dependent vegetation communities (phreatophytic vegetation). Reduction or loss of habitats associated with water sources would impact terrestrial wildlife dependent on these sources, resulting in a possible reduction or loss of cover, breeding sites, foraging areas, and changes in both plant and animal community structure. Naturally occurring seeps, springs, and perennial stream reaches provide important wildlife habitat in the region of study. These habitats and their associated plant communities contribute to greater wildlife species diversity, as compared to the adjacent upland areas. Since surface water and associated habitats are limiting factors for wildlife in the study area, loss of these habitat features would alter the available habitat for species that depend on these areas, resulting in: 1) a reduction of available water for consumption; 2) a reduction in amount or quality of groundwater dependent vegetation types for breeding, foraging, and cover; 3) a reduction in the regional carrying capacity; 4) displacement and loss of animals; 5) a reduction in the overall biological diversity; 6) a potential long-term impact to the population numbers of some species; and 7) reduction in prey availability.

The degree of impacts to wildlife resources would depend on a number of variables, such as the existing habitat values and level of use, species' sensitivity (i.e. level of dependency on groundwater dependent habitats), the extent of the

anticipated water and habitat reductions/shifts, and capacity for wildlife to accommodate additional effects, such as climate change.

Due to the limited amount of perennial streams and springs and associated wetlands, wet meadow, and riparian habitats within the study area, it is assumed that terrestrial species dependent on these areas are currently at carrying capacity. Consequently, while some species that are displaced due to the reduction in these habitats may be able to move into adjacent areas, it is assumed that these adjacent habitats are already at their full carrying capacity and would not support additional animals. Therefore, some individuals would be lost from the population, concentrating the remaining animals within smaller habitat areas. Species groups likely affected by reduction in groundwater dependent habitats would include: big game, small mammals, carnivores, upland game birds, waterfowl, nongame birds (e.g. raptors and passerines), bats, reptiles, and invertebrates.

Pumping Effects Analysis

Based on evaluations of the model-predicted 10-foot groundwater drawdown contour for the Proposed Action pumping and geology and groundwater characteristics, there is potential risk to terrestrial wildlife species habitat (perennial streams, springs, ET wetland/meadow and basin shrubland) in portions of 8 basins (Spring, Snake, Cave, Pahranagat, Steptoe, Hamlin, Lake, and Lower Meadow Valley Wash) during the three model time frames (full build out, full build out plus 75 years, and after full build out plus 200 years). **Figure 3.5-6**, Vegetation Resources, illustrates the expansion of the 10-foot drawdown contour in relation to the wetland and phreatophytic cover types. **Figures F3.3.8A-1** through **F3.3.8A-3** in **Appendix F3.3** show the potentially impacted perennial waters at the three model time frames for the full water resources region of study. It should be clarified that there are uncertainties associated with the model analysis as described in Section 3.3, Water Resources. This would apply to all impact discussions for individual alternatives, as well as cumulative impacts associated with each alternative.

Pine Valley, Wah Wah Valley, Tule Valley, and Fish Springs Flat basins (**Figure 3.0-3**) are located to the east of the northeast boundary of the water resources region of study, but are part of the natural resources region of study. While the groundwater flow model results suggest that drawdown attributable to the Proposed Action pumping scenario could eventually extend into Pine Valley, depth to the regional groundwater flow system in this valley is so deep that risk to groundwater dependent habitats in this valley are unlikely (see discussion in Section 3.3, Water Resources). There is some predicted reduction in flow from Snake Valley to Pine, Wah Wah, and Tule valleys that could eventually result in a reduction of discharge as Fish Springs, if the groundwater flow system is interconnected and regional flow from Snake Valley contributes to flow at Fish Springs. However, as explained in Section 3.3, Water Resources, flow reductions of this magnitude would likely be difficult to measure and distinguish from natural flow variations. See **Appendix F**, **Table F3.6-1** for species that occur in these valleys.

Full Build Out. Valleys and miles of perennial streams where surface waters could be impacted include approximately 6 miles (3 percent of the perennial stream miles in the valley) in Spring Valley. Eight springs are located in high and moderate risk areas in one valley (Spring). This represents 1 percent of springs in Spring Valley. Small percentages of ET wetland meadow (1 percent) and basin shrubland (12 percent) in Spring Valley may be potentially affected (**Appendix F**, **Table F3.6-9**).

Full Build Out Plus 75 Years. Valleys and miles of perennial streams where surface waters could be impacted include 26 miles (13 percent of the stream miles in the valley) in Spring Valley and 54 miles (25 percent) in Snake Valley (of which 11 miles falls within Utah). The 212 springs are located in high and moderate risk areas in Spring, Snake, and Hamlin valleys, including nine springs in Utah. This represents 20 percent of springs in Spring Valley, 8 percent in Snake Valley, and 1 percent in Hamlin Valley. ET vegetation types are potentially impacted in two additional valleys (Snake and Hamlin) as compared to the full build out time frame; in the case of Hamlin Valley where there is limited ET vegetation, 100 percent of wetland meadow and 94 percent of basin shrubland ET types are in areas that may be potentially impacted. In Spring Valley the percent of ET wetland meadow and basin shrubland increases to 27 and 66 percent, respectively (**Appendix F**, **Table F3.6-9**).

Full Build Out Plus 200 Years. Valleys and miles of perennial streams where surface waters could be impacted include 38 miles (19 percent of the stream miles in the valley) in Spring Valley, 63 miles (29 percent) in Snake Valley (of which 13 miles falls within Utah), less than 1 mile (2 percent) in Pahranagat, 4 miles (3 percent) in Steptoe, 3 miles (35 percent) in Lake, and 3 miles (5 percent) in Lower Meadow Valley Wash. The 305 springs located in high to

moderate risk areas in Spring, Snake, Hamlin, Cave, and Lake valleys. The number also includes 10 springs in Utah and 3 springs within the boundary of the GBNP (an important bird area). See **Appendix F**, **Table F3.6-9** for percentage of springs within each valley. ET vegetation types are potentially impacted in three additional valleys (Lake, Lower Meadow Valley Wash, and Pahranagat). The percent of ET wetland meadow and basin shrubland potentially impacted in Spring Valley increases to 34 and 71 percent, respectively (**Appendix F**, **Table F3.6-9**).

The following terrestrial wildlife impacts could occur in response to groundwater pumping as outlined in the general discussion.

Species of Management Concern

Big Game: Big game species require water, as needed, to satisfy physiological requirements. The reduction or loss of existing water sources could impact big game species use and movements. Due to reduced habitat availability resulting from earlier habitat alteration in the area as discussed under surface impacts (ROW and groundwater development areas), populations of big game that currently utilize these disturbed areas may already be under some stress. It is assumed that some individuals could be displaced due to the potential reduction in water availability and associated habitats and may move into adjacent areas that are already at their carrying capacity. These displaced individuals could be lost from the population; however, this loss cannot be quantified.

Other Terrestrial Species of Management Concern: A reduction in groundwater dependent vegetation communities would affect the amount of nesting, brooding, and foraging habitat for upland game birds, and denning and foraging habitat for small mammals. A decline in available surface water would impact the extent of open water and these habitats along portions of perennial streams, springs, and seeps. Since these communities are limited within the study areas, it cannot be assumed that displaced individuals would successfully relocate into adequate breeding or foraging habitat in adjacent areas, as it is assumed that these habitats already would be at carrying capacity. As a result, some animals could be lost from the population.

A variety of bird species may breed, forage, or roost in or near the region of study as described earlier in the section. Potential long-term impacts to bird species could include loss of nesting, roosting, and foraging habitat along perennial stream reaches and at seeps and springs and associated habitats that occur within the drawdown area. These losses would result from an incremental reduction in available habitat for both resident and migratory bird species. In addition, the regional carrying capacity would be reduced by the incremental loss of available nest and roost sites. Some bird species are closely associated with groundwater dependent habitats that support trees and increased shrub density while other species may use these trees for roosting only. Impacts may also include reductions in prey populations.

Potential impacts to reptile species that are associated with groundwater dependent habitats that may be affected by pumping-related drawdown would parallel those discussed for other terrestrial wildlife species. The loss or reduction in water availability and associated vegetation communities could result in an incremental loss of suitable breeding, foraging, cover habitat, and potential reductions in prey base for these species. Impacts on species would depend on the species' ability to move to adjacent habitats, especially smaller less mobile species.

Given the potential for change in abundance and distribution of prey species dependent on groundwater dependent habitats, there also is potential to impact predator species. Birds and bats that feed on insects and raptors and predator mammals that feed on small mammals are examples of predators that also may experience local population reductions and shifts in distribution if their prey base decreases as a result of decreased groundwater dependent habitat. Impacts on predator species would depend on the species' ability to move to adjacent habitats or switch prey type.

Special Status Species

General impacts to special status species would be the same as described above for management concern species and in the general wildlife discussion above. Extent of potential impacts for various special status species or species groups is described below.

- **Desert Tortoise (Federally Threatened)**: Impacts to desert tortoise or desert tortoise-critical habitat would not be anticipated from Proposed Action pumping as the tortoise is not dependent on habitats that may be affected by drawdown.

- **Southwestern Willow Flycatcher, Yellow-billed Cuckoo, and Yuma Clapper Rail (Federally Endangered, Federal Candidate, Federally Endangered)**: These three species use riparian habitats, a habitat type that would potentially be at risk from drawdown. A reduction in groundwater dependent vegetation communities would affect the amount of nesting, brooding, and foraging habitat available for these species. There are two basins (Lower Meadow Valley Wash and Pahranagat) where model-predicted drawdown effects to water resources overlap with southwestern willow flycatcher habitat and where potential effects to water resources overlap with yellow-billed cuckoo migratory range. However, Yuma clapper rail is not currently known to occur in these basins.

  Lower Meadow Valley Wash contains a perennial stream segment that could be impacted at the full build out plus 200 years time frame. Of the approximately 42 miles of Lower Meadow Valley Wash (stream) in Lower Meadow Valley Wash Valley, model results suggest that 8 percent of the stream could be impacted by drawdown. Impacts in flow would depend on the actual drawdown that occurs in these areas and the site-specific hydraulic connection between the groundwater system impacted by pumping and Lower Meadow Valley Wash stream. If this stream is hydraulically connected to the groundwater system impacted by pumping and within the drawdown area, it would likely experience a reduction in baseflow that could result in changes to available riparian habitat for yellow-billed cuckoo and southwestern willow flycatcher habitat. Model results suggest that in the full build out plus 200 years time frame, 2 percent of perennial streams in Pahranagat Valley (0.5 mile) could be impacted by project-related pumping. This valley is important to these two bird species.

- **Greater Sage-grouse (Federal Candidate):** In summer, greater sage-grouse hens with broods move to more mesic habitats with higher food availability in the form of insects and forbs. While this species uses sagebrush for much of the year, these mesic habitats, including habitats around springs, perennial streams, and ET wetland/meadow are the focus of this discussion as they would potentially be impacted by drawdown and are a key seasonal habitat for sage-grouse. At the full build out time frame and within PPH and PGH for greater sage-grouse, ET basin shrubland as well as springs may be impacted by drawdown. Perennial stream segments in Spring Valley could also be impacted during this time frame as suggested by model results. In the full build out plus 75 years time frame, 3 basins (Spring, Snake, and Hamlin) have ET vegetation types, springs or perennial stream segments at potential risk. By full build out plus 200 years, 5 basins contain these potential affected habitats based on groundwater model predictions, the 3 mentioned previously as well as Cave and Steptoe valleys. Potential pumping impacts, when combined with potential groundwater development surface impacts, could result in the reduction or even loss of some local sage-grouse populations in Cave, Snake, and Spring valleys. While there is greater sage-grouse brooding habitat in Pine Valley, groundwater in this valley is so deep that risk to groundwater dependent habitats from drawdown are unlikely (Section 3.3, Water Resources). Greater sage-grouse is a culturally sensitive species.

- **Additional Special Status Bird Species including Raptors and Important Bird Areas**: In the eight valleys with springs, perennial streams, or ET wetland/meadow or basin shrubland that could potentially be impacted by drawdown, there are many special status bird species that use these habitats for nesting, roosting, or foraging. See **Appendix F**, **Table F3.6-1** for special status bird species that occur or are suspected to occur in the various basins. Important bird areas that have springs or perennial streams that could potentially be impacted by drawdown include: GBNP (6 miles perennial stream in the full build out plus 75 years time frame, and 2 springs and 10 miles of perennial stream and 4 springs in the full build out plus 200 years time frame), D.E. Moore Bird and Wildlife Sanctuary (approximately 2 miles of perennial stream) in the full build out plus 75 and plus 200 years time frames; Lower Meadow Valley Wash important bird area (3 miles of perennial stream) at the full build out plus 200 years time frame; and Pahranagat Valley Complex (less than 1 mile of perennial stream) at the full build out plus 200 years time frame. The model suggests that impacts in flow are anticipated to Big Springs and approximately 10 miles of Lake Creek and 9 miles of Big Springs Creek are in areas that could be impacted in the full build out plus 75 years time frame. Therefore, it is anticipated that the bird habitat conservation area associated with Lake Creek/Big Springs Creek and Pruess Lake could be impacted. Groundwater pumping could result in reductions in flow as well as in vegetation composition and structure changes as described in the Section 3.4, Vegetation Resources. These potential habitat changes could result in reductions in local populations of other special status birds or changes in species composition as well as potential changes in prey base. Some species of raptors are culturally sensitive species.

- **Pygmy Rabbit**: While this species primarily uses sagebrush as forage, in the summer, forbs and grasses also can become part of its diet. Mesic foraging habitat that would potentially be at risk from drawdown includes habitats near springs, perennial streams, and ET wetland/meadow and basin shrubland. Pygmy rabbit mesic foraging habitat could be potentially impacted by drawdown in seven valleys including: Spring, Snake, Lake, Hamlin, Cave, Pahranagat, and Steptoe during the time frames explained above in the general pumping effects analysis. Pygmy rabbit is a culturally sensitive species.

- **Bats:** The 22 special status bats are insectivores and their most productive foraging habitats often include areas near water that support higher insect populations. These habitats, including springs, perennials streams, and ET wetland/meadows and the associated prey base could be at risk from drawdown. Eight valleys have habitats important to bat foraging that would potentially be impacted by drawdown including: Spring, Snake, Lake, Hamlin, Cave, Pahranagat, Steptoe, and Lower Meadow Valley Wash. See **Appendix F**, **Table F3.6-1** for special status bat species that occur or are suspected to occur in the various basins.

- **Gila Monster**: This species is found in canyon bottoms or arroyos with permanent or intermittent streams (Wildlife Action Plan Team 2006). Habitats this species uses with potential for impact from drawdown include springs and perennial streams. In Pahranagat Valley during the full build out plus 200 years time frame, model results indicate that less than 1 mile of perennial stream in the valley may be at risk from project-related pumping. In the same time frame in Lower Meadow Valley Wash Valley, approximately 3 miles are potentially at risk. In these two valleys, habitat used by the gila monster may be impacted by groundwater drawdown.

- **Baking Powder Flat Blue Butterfly and Other Terrestrial Invertebrates**: Blind Spring within the Baking Powder Flat ACEC (Spring Valley) could potentially be impacted by drawdown based on the model-predicted 10-foot drawdown in the full build out plus 75 years time frame. While the Baking Powder Flat blue butterfly has habitat in this area, it is not anticipated that the butterfly's host plant, Shockley's buckwheat, would be impacted by drawdown as it is an upland plant. White River valley skipper may be impacted in two valleys (Lake and Spring) as its apparent host plant is Mexican rush, a wetland species. McNeil's sooty wing skipper is not suspected to occur in a valley where potential drawdown impacts to springs, perennials streams or ET vegetation types are predicted.

Other Wildlife Species of Interest

Cave Species: As explained in Section 3.3, Water Resources, Baker (2009) has identified 6 caves in direct contact with the water table or surface water and within susceptibility areas (Elliott et al 2006). These are Model Cave, Ice Cave, Wheeler's Deep Cave and Systems Key Cave in the Baker Creek watershed; Squirrel Springs Cave in the Snake Creek watershed; and Water Trough Cave in the Can Young watershed. While available information suggests that stream flow within Ice Cave, Systems Key Cave, and Squirrel Springs Cave are likely not tied to regional groundwater, information is not available to determine the likely source of water in the other caves. **Table 3.6-16** lists water-associated cave biota found within all six caves.

Table 3.6-16 Cave Biota Associated with Water Found in Selected Great Basin National Park Caves

	Ice Cave	Model Cave	Squirrel Springs Cave	Systems Key Cave	Water Trough Cave	Wheeler's Deep Cave
Mollusca:Gastropoda:*Gyraulus parvus*	X	X	X	X		X
Nematoda		X				
Oligochaeta: *Haplotaxis* cf. *gordioides* (aquatic earthworm)		X		?	?	
Crustacea:Copepoda		X		X		
Crustacea:Ostracoda		X		X		
Arachnida:Acari:Rhagidiidae (Rhagidiid mite)	X	X	X	X	X	
Arachnida:Opiliones: *Cyptobunus ungulatus ungulatus*		X		X		X

Table 3.6-16 Cave Biota Associated with Water Found in Selected Great Basin National Park Caves (Continued)

	Ice Cave	Model Cave	Squirrel Springs Cave	Systems Key Cave	Water Trough Cave	Wheeler's Deep Cave
Arachnida:Pseudoscorpiones: Neobisiidae: *Microcreagris grandis*		X	X		X	
Diplopoda: *Idagona lehmansis* (millipede)		X	X	?	X	X
Diplopoda:*Nevadesmus ophimontis*	X	X				X
Hexapoda:Collembola: Arrhopalitidae: *Pygmarrhopalites shoshoneiensis* (springtail)		X				
Diplura		X				
Ephemeroptera (Mayflies)	X				X	
Plecoptera (Stoneflies)					X	
Trichoptera (Caddisflies)	X		X		X	
Amphipod		X				

Source: Baker (2009).

If these caves have waters associated with them that are dependent on discharge from the regional groundwater flow system, habitat for cave obligate species, like those listed in the table, may be impacted as a result of Proposed Action pumping. Loss or reduction in water flow could result in reduced habitat for these species and may result in the loss of individuals. As explained in Section 3.3, Water Resources, the upland setting of most of these caves may indicate that these cave waters are tied to locally derived precipitation. However, given the uncertainty regarding the source of water in these caves, potential for impacts to these cave obligate species is unclear. Ongoing work by the NPS on the water sources in caves will provide additional information in the future.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on terrestrial wildlife resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

ACMs and Monitoring and Mitigation Measures: ACMs would be implemented to reduce groundwater pumping effects on environmental resources. The measures would involve monitoring, management, and mitigation measures required by existing agreements and adaptive management measures. The following items highlight those measures relative to habitats important to terrestrial wildlife. The ACM number from **Appendix E** is noted in parentheses.

Existing Agreements

- Implement biological and hydrologic monitoring, management, and mitigation, as required by the Spring Valley Stipulation (ACM C.1.1), the Biological Monitoring Plan for the Spring Valley Stipulation (Biological Work Group 2011), and the Spring Valley Hydrologic Monitoring and Mitigation Plan (Hydrographic Area 184) (SNWA 2009b).
- Consider alternative withdrawal points from Shoshone Ponds, as part of the Spring Valley Stipulated Agreement (ACM C.1.3).
- Monitor groundwater levels at agreed-upon monitoring wells in the Spring Valley and Hamlin Valley basins, as required by the Spring Valley Stipulation (ACM C.1.8).
- Maintain a discharge monitoring site at Big Springs and Cleve Creeks, with regular public reporting (ACM C.1.16).

- Ensure continued groundwater monitoring at agreed-upon monitoring wells, to characterize the movement of groundwater from the Delamar, Dry Lake, and Cave basins to adjacent basins (White River, Pahroc, and Pahranagat valleys), as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.31).
- Implement biological monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42) and the Biological Monitoring Plan for the Delamar, Dry Lake, and Cave Stipulation (BRT 2011). Monitor sage-grouse breeding and late brood-rearing habitat that is groundwater dependent, as well as water-dependent ecosystems on the valley floors, as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42).
- Monitor selected sites for special status species and their habitat in Pahranagat Valley (Pahranagat NWR, Key Pittman WMA, and Ash, Crystal, and Hiko springs) and White River Valley (Hot Creek, Flag, Moorman, and Hardy springs and phreatophytic habitats that support special status species in the Middle and Lower White River Valley, including Kirch WMA), per the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42).
- Follow Candidate Conservation Agreements with Assurances for the greater sage-grouse and pygmy rabbit on SNWA private properties (to be provided when completed) **(Appendix E**, Section C.1. (Measures from SNWA Agreements).
- Implement hydrologic monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation and the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (SNWA 2009c).

Applicant-Committed Adaptive Management Measures

- Reduce or cease groundwater withdrawals. Reduction or cessation of pumping would be determined on a case-by-case basis for individual production wells or well field using technical and consultation processes indentified in the stipulated agreements.
- Acquire real property or water rights that are dedicated to the recovery of special status species within their current and historic habitat range (ACM C.2.1).
- Improve late brood-rearing habitat for sage-grouse at the Stonehouse and Larson parcels on the SNWA Robison Ranch property in north Spring Valley, by use of gabion structures to expand and enhance riparian meadow habitat (ACM C.2.2).
- Assist the BLM with pinyon-juniper control and sagebrush habitat improvement projects in suitable areas in the project-development basins (including Spring, Snake, and Cave valleys) and with secondary opportunities in non-project development basins (including Lake and White River valleys) (ACM C.2.3).
- Conduct large-scale seeding to assist with vegetation transitions from phreatophytic communities in Spring and Snake valleys, to benefit wildlife (ACM C.2.5).
- Conduct wetlands-area restoration at Big Springs and Pruess lakes in Snake Valley, to enhance habitat for bald eagle, migratory birds, greater sandhill crane, and long billed curlew (ACM C.2.7).
- Work with NDOW and private land owners at and downstream of Hiko, Crystal, and Ash Springs, as allowed, in Pahranagat Valley to conduct habitat restoration and remove nonnative species to benefit Hiko White River springfish, White River springfish, and Pahranagat roundtail chub (ACM C.2.9). Habitat restoration activities could also benefit southwestern willow flycatcher and yellow-billed cuckoo.
- Work with the irrigation district in Pahranagat Valley to develop system efficiencies and manage water releases to benefit native fish (ACM C.2.10). Water efficiency and releases can also be managed to benefit native wildlife.
- Work with USFWS and NDOW to improve and/or expand southwestern willow flycatcher habitat on Pahranagat NWR and Key Pittman WMA, respectively (ACM C.2.11 and ACM C.2.12).
- Assist the BLM with habitat-enhancement projects in Rainbow Canyon of Lower Meadow Valley Wash, to improve conditions for southwestern willow flycatchers and yellow-billed cuckoo (ACM C.2.14).

- Reduce or change grazing in wet meadows, to improve habitat for migratory birds, waterfowl, shore bird, sage-grouse, raptors, and bats in the BLM grazing allotments on which SNWA holds grazing permits (ACM C.2.18).
- Conduct facilitated recharge projects to offset local groundwater drawdown, to benefit sensitive biological areas (ACM C.2.21).

Monitoring and Mitigation Recommendations

The following proposed monitoring and mitigation measures are intended to supplement the existing monitoring and mitigation commitments included in the stipulated agreements, the ACMs described in **Appendix E,** and are included in the COM Plan (Section 3.20). These will be considered in subsequent NEPA.

GW-WL-8: Artificial Water Sources for Big Game. If groundwater pumping by the SNWA results in the loss of existing water sources used by big game, the SNWA, in coordination with the BLM or NPS and NDOW, would develop and maintain artificial water sources to maintain current distribution of big game. Water would come from SNWA allocations. Effectiveness: This measure would be effective in mitigating for loss of a big game water source. Effects on other resources: Creation of artificial water sources may benefit some species and negatively impacts others (e.g. kit fox can have difficulty competing with coyotes in habitat with artificial water sources) (Arjo et al. 2007).

GW-WL-9: Greater sage-grouse monitoring in Hamlin Valley. SNWA and BLM would coordinate with USFWS, UDWR, and NDOW to develop monitoring of the greater sage-grouse using leks in Hamlin Valley. Goals of the monitoring program would include, but not be limited to, determining if birds using Hamlin Valley leks are migratory and what, if any, groundwater dependent habitats the birds may be using. Effectiveness: This measure would be effective in determining whether greater sage-grouse in Hamlin Valley are migratory. Monitoring also would provide additional information, not currently available, to assess potential impacts to greater sage-grouse in Hamlin Valley.

GW-WL-10: Monitoring on BLM Lands within Greater Sage-grouse Habitat. In concert with GW-WR-3, on BLM lands, require biological and hydrologic monitoring of greater sage-grouse groundwater-dependent habitats in areas that may be affected by groundwater pumping. Hydrologic monitoring should be continuous (e.g., piezometers and soil tensiometer/piezometers) at all sites where sage-grouse habitat is being monitored. Effectiveness: This measure would provide additional information, not currently available, to assess potential impacts to greater sage-grouse and its habitat from groundwater pumping.

In order to minimize or mitigate potential effects if monitoring shows impacts to greater sage-grouse or to its habitat from SNWA's groundwater pumping GW-WR-7: Groundwater Development and Drawdown Effects to Federal Resources and Federal Water Rights also is recommended. Other monitoring and mitigation measures relevant to Terrestrial Wildlife include: GW-WR-3a (Comprehensive Water Resources Monitoring Plan), GW-WR-3b (Numerical Groundwater Flow Modeling Requirements), GW-WR-5 (Shoshone Ponds), GW-VEG-3 (Wetlands Monitoring), GW-VEG-4 (Phreatophytic Monitoring), and GW-VEG-5 (Swamp Cedar Monitoring) (see Water Resources, Section 3.3, for complete wording of GW-WR-3A, GW-WR-3b, GW-WR-5, and GW-WR-7).

As described in Water Resources, Section 3.3, GW-WR-3a (Comprehensive Water Resources Monitoring Plan) would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

As described in Water Resources Section 3.3.2, GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights) would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Mitigation planning also could be developed as part of the Snake Valley 3M plan (**Appendix B**). Management actions included in the Snake 3M Plan that will be considered will include geographic redistribution of groundwater withdrawls; reduction or cessation of groundwater withdrawls; provision of consumptive water supply requirements using surface and/or groundwater sources; acquisition of property or water rights dedicated to management of special status species; and augmentation of water supply and/or acquisition of existing water rights.

Potential residual impacts include:

As described in Section 3.3, Water Resources, there is a potential reduction in the surface discharge at perennial surface water areas that cannot be avoided as well as an unavoidable long-term reduction in groundwater discharge to ET areas. Successful implementation of ACMs and monitoring and mitigation recommendations would likely reduce adverse effects on terrestrial wildlife species and their groundwater dependent habitats at some locations. However, it is not possible to determine the level of impact reduction at this time. Residual effects on some terrestrial wildlife habitats and local populations of species could exist considering the regional scale of pumping. The objectives of the COM Plan include avoiding adverse impacts to listed species and critical habitat and avoiding, minimizing, or mitigating adverse impacts to habitat for wildlife. Groundwater dependent habitat types would decline in extent and/or productivity in some locations and local populations of species that use the habitat in these locations would likely decline as well.

A summary of impact information including ACMs and mitigation recommendations is provided for the Proposed Action in **Table 3.6-17**. This same tabular presentation is used in subsequent pumping effects analyses for Alternatives A through F and No Action.

Table 3.6-17 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Proposed Action Pumping

Effects/Conclusions
• Groundwater pumping under the Proposed Action would affect terrestrial wildlife resources in 8 hydrologic basins (Spring, Snake, Cave, Pahranagat, Steptoe, Hamlin, Lake, and Lower Meadow Valley Wash) during the 3 model time frames (full build out, full build out plus 75 years, and full build out plus 200 years). There are some reductions to total predicted flow from Snake Valley to Pine, Wah Wah, and Tule valleys that could eventually result in a reduction in discharge to Fish Springs if groundwater flow system is interconnected. For all species dependant on groundwater dependent habitats (i.e., springs, perennial streams and ET wetland/meadow and basin shrubland habitats), due to the limited amount of these habitats within the study area, it is assumed that species' habitats are currently at carrying capacity. As a result, while individuals displaced due to the reduction in these habitats may be able to move, it is assumed that adjacent habitats are already at their full carrying capacity and would not support additional animals. Therefore, some individuals would be lost from the population concentrating the remaining animals within smaller habitat areas. • Big Game: The reduction or loss of existing water sources could impact big game species use and movements. It is assumed that some individuals could be displaced due to the potential reduction in water availability and associated habitats and may move into adjacent areas that are already at their carrying capacity. These displaced individuals could be lost from the population; however, this loss cannot be quantified. • Other Terrestrial Species of Management Concern: A reduction in groundwater dependent vegetation communities would affect the amount of nesting, brooding, foraging, roosting habitat for management concern birds, and denning and foraging habitat for management concern small mammals and reptiles. A decline in available surface water would impact the extent of open water and these habitats along portions of perennial streams, springs, and seeps. Since these communities are limited within the study area, it cannot be assumed that displaced individuals would successfully relocate into adequate breeding or foraging habitat in adjacent areas, as it is assumed that these habitats already would be at carrying capacity. As a result, some animals could be lost from the population. Impacts on species would depend on the species' ability to move to adjacent habitats, especially smaller less mobile species. Impacts may also include reductions in prey populations. With potential change in abundance and distribution of prey species dependent on groundwater dependent habitats, there also is potential to impact predator species. Impacts on predator species would depend on the species' ability to move to adjacent habitats or switch prey type. • Important Bird Areas: There are two important bird areas with springs or streams where impacts to flow could occur (D.E. Moore and GBNP) at the full build out plus 75 years time frame. At the full build out plus 200 year timeframe, an additional two IBAs have springs or streams where impacts to flow could occur (Lower Meadow Valley Wash and Pahranagat Valley Complex).

Table 3.6-17 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Proposed Action Pumping (Continued)

Effects/Conclusions
• SWWF and YBC: Based on model results, there are two basins (Lower Meadow Valley Wash and Pahranagat) where model-predicted drawdown effects to water resources overlap with southwestern willow flycatcher habitat and where potential effects to water resources overlap with yellow-billed cuckoo migratory range at the full build out plus 200 years time frame. • Greater sage-grouse: At the full build out time frame and within PPH and PGH for greater sage-grouse, ET basin shrubland as well as springs may be impacted by drawdown. Perennial stream segments in Spring Valley could also be impacted during this time frame as suggested by model results. In the full build out plus 75 years time frame, 3 basins (Spring, Snake, and Hamlin) have ET vegetation types, springs or perennial stream segments at potential risk. By full build out plus 200 years, 5 basins contain these potential affected habitats based on groundwater model predictions, the 3 mentioned previously as well as Cave and Steptoe valleys. Potential pumping impacts, when combined with potential groundwater development surface impacts, could result in the reduction or even loss of some local sage grouse populations in Cave, Snake, and Spring valleys.
Impact Indicators by Model Timeframe
• **Full Build Out.** Valleys and miles of perennial streams where surface waters could be impacted include approximately 6 miles (3 percent of the perennial stream miles in the valley) in Spring Valley. Eight springs are located in high and moderate risk areas in one valley (Spring). This represents 1 percent of springs in Spring Valley. Small percentages of ET wetland meadow (1 percent) and basin shrubland (12 percent) in Spring Valley may be potentially affected (**Appendix F, Table F3.6-9**). • **Full Build Out Plus 75 Years.** Valleys and miles of perennial streams where surface waters could be impacted include 26 miles (13 percent of the stream miles in the valley) in Spring Valley and 54 miles (25 percent) in Snake Valley (of which 11 miles falls within Utah). The 212 springs are located in high and moderate risk areas in Spring, Snake, and Hamlin valleys, including nine springs in Utah. This represents 20 percent of springs in Spring Valley, 8 percent in Snake Valley, and 1 percent in Hamlin Valley. ET vegetation types are potentially impacted in two additional valleys (Snake and Hamlin) as compared to the full build out time frame; in the case of Hamlin Valley where there is limited ET vegetation, 100 percent of wetland meadow and 94 percent of basin shrubland ET types are in areas that may be potentially impacted. In Spring Valley the percent of ET wetland meadow and basin shrubland increases to 27 and 66 percent, respectively (**Appendix F, Table F3.6-9**). • **Full Build Out Plus 200 Years.** Valleys and miles of perennial streams where surface waters could be impacted include 38 miles (19 percent of the stream miles in the valley) in Spring Valley, 63 miles (29 percent) in Snake Valley (of which 13 miles falls within Utah), less than 1 mile (2 percent) in Pahranagat, 4 miles (3 percent) in Steptoe, 3 miles (35 percent) in Lake, and 3 miles (5 percent) in Lower Meadow Valley Wash. The 305 springs located in high to moderate risk areas in Spring, Snake, Hamlin, Cave, and Lake valleys. The number also includes 10 springs in Utah and 3 springs within the boundary of the GBNP (an important bird area). See **Appendix F, Table F3.6-9** for percentage of springs within each valley. ET vegetation types are potentially impacted in three additional valleys (Lake, Lower Meadow Valley Wash, and Pahranagat). The percent of ET wetland meadow and basin shrubland potentially impacted in Spring Valley increases to 34 and 71 percent, respectively (**Appendix F, Table F3.6-9**).
COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures including ACMs and mitigation recommendations for wildlife resources are summarized below.
BLM RMP Direction and ACMs
• Implement biological and hydrologic monitoring, management, and mitigation, as required by the Spring Valley Stipulation (ACM C.1.1), the Biological Monitoring Plan for the Spring Valley Stipulation (Biological Work Group 2011), and the Spring Valley Hydrologic Monitoring and Mitigation Plan (Hydrographic Area 184) (SNWA 2009b). • Consider alternative withdrawal points from Shoshone Ponds, as part of the Spring Valley Stipulated Agreement (ACM C.1.3). • Monitor groundwater levels at agreed-upon monitoring wells in the Spring Valley and Hamlin Valley basins, as required by the Spring Valley Stipulation (ACM C.1.8). • Maintain a discharge monitoring site at Big Springs and Cleve Creeks, with regular public reporting (ACM C.1.16). • Ensure continued groundwater monitoring at agreed-upon monitoring wells, to characterize the movement of groundwater from the Delamar, Dry Lake, and Cave basins to adjacent basins (White River, Pahroc, and Pahranagat valleys), as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.31).

Table 3.6-17 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Proposed Action Pumping (Continued)

BLM RMP Direction and ACMs

- Implement biological monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42) and the Biological Monitoring Plan for the Delamar, Dry Lake, and Cave Stipulation (BRT 2011). Monitor sage-grouse breeding and late brood-rearing habitat that is groundwater dependent, as well as water-dependent ecosystems on the valley floors, as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42).
- Monitor selected sites for special status species and their habitat in Pahranagat Valley (Pahranagat NWR, Key Pittman WMA, and Ash, Crystal, and Hiko springs) and White River Valley (Hot Creek, Flag, Moorman, and Hardy springs and phreatophytic habitats that support special status species in the Middle and Lower White River Valley, including Kirch WMA), per the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42).
- Follow Candidate Conservation Agreements with Assurances for the greater sage-grouse and pygmy rabbit on SNWA private properties (to be provided when completed) (Appendix E, Section C.1. (Measures from SNWA Agreements).
- Implement hydrologic monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation and the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (SNWA 2009c). Reduce or cease groundwater withdrawals. Reduction or cessation of pumping would be determined on a case-by-case basis for individual production wells or well field using technical and consultation processes indentified in the stipulated agreements.
- Acquire real property or water rights that are dedicated to the recovery of special status species within their current and historic habitat range (ACM C.2.1).
- Improve late brood-rearing habitat for sage-grouse at the Stonehouse and Larson parcels on the SNWA Robison Ranch property in north Spring Valley, by use of gabion structures to expand and enhance riparian meadow habitat (ACM C.2.2).
- Assist the BLM with pinyon-juniper control and sagebrush habitat improvement projects in suitable areas in the project-development basins (including Spring, Snake, and Cave valleys) and with secondary opportunities in non-project development basins (including Lake and White River valleys) (ACM C.2.3).
- Conduct large-scale seeding to assist with vegetation transitions from phreatophytic communities in Spring and Snake valleys, to benefit wildlife (ACM C.2.5).
- Conduct wetlands-area restoration at Big Springs and Pruess lakes in Snake Valley, to enhance habitat for bald eagle, migratory birds, greater sandhill crane, and long billed curlew (ACM C.2.7).
- Work with NDOW and private land owners at and downstream of Hiko, Crystal, and Ash Springs, as allowed, in Pahranagat Valley to conduct habitat restoration and remove nonnative species to benefit Hiko White River springfish, White River springfish, and Pahranagat roundtail chub (ACM C.2.9). Habitat restoration activities could also benefit southwestern willow flycatcher and yellow-billed cuckoo.
- Work with the irrigation district in Pahranagat Valley to develop system efficiencies and manage water releases to benefit native fish (ACM C.2.10). Water efficiency and releases can also be managed to benefit native wildlife.
- Work with USFWS and NDOW to improve and/or expand southwestern willow flycatcher habitat on Pahranagat NWR and Key Pittman WMA, respectively (ACM C.2.11 and ACM C.2.12).
- Assist the BLM with habitat-enhancement projects in Rainbow Canyon of Lower Meadow Valley Wash, to improve conditions for southwestern willow flycatchers and yellow-billed cuckoo (ACM C.2.14).
- Reduce or change grazing in wet meadows, to improve habitat for migratory birds, waterfowl, shore bird, sage-grouse, raptors, and bats in the BLM grazing allotments on which SNWA holds grazing permits (ACM C.2.18).
- Conduct facilitated recharge projects to offset local groundwater drawdown, to benefit sensitive biological areas (ACM C.2.21).

Monitoring Recommendations

- **GW-WL-9: Greater sage-grouse monitoring in Hamlin Valley**. SNWA and BLM will coordinate with USFWS, UDWR, and NDOW to develop monitoring of the greater sage-grouse using leks in Hamlin valley. Goals of the monitoring program will include, but not be limited to, determining if birds using Hamlin valley leks are migratory and what, if any, groundwater dependent habitats the birds may be using.
- **GW-WL-10: GW Monitoring on BLM Lands within Greater sage-grouse habitat**. In concert with GW-WR-3, on BLM lands, require biological and hydrologic monitoring of greater sage-grouse groundwater-dependent habitats in areas that may be affected by groundwater pumping. Hydrologic monitoring should be continuous (e.g., piezometers and soil tensiometer/piezometers) at all sites where sage-grouse habitat is being monitored.
- Other monitoring measures relevant to Terrestrial Wildlife include **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)**, **GW-VEG-3 (Wetlands Monitoring)**, **GW-VEG-4 (Phreatophytic Vegetation Monitoring)**, and **GW-VEG-5 (Swamp Cedar Monitoring)** (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

Table 3.6-17 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Proposed Action Pumping (Continued)

Mitigation Recommendations
• **GW-WL-8: Artificial Water Sources for Big Game**. If groundwater pumping by the SNWA results in the loss of existing water sources used by big game, the SNWA, in coordination with the BLM or NPS and NDOW, will develop and maintain artificial water sources to maintain current distribution of big game. Water will come from SNWA allocations. • In order to minimize or mitigation potential effects if monitoring shows impacts to greater sage-grouse or to its habitat from SNWA's groundwater pumping **GW-WR-7: Groundwater Development and Drawdown Effects to Federal Resources and Federal Water Rights** also is recommended. Another mitigation measure relevant to Terrestrial Wildlife includes: **GW-WR-5 (Shoshone Ponds)** (see Water Resources, Section 3.3, for complete wording of GW-WR-5 and GW-WR-7). • Mitigation planning also could be developed as part of the Snake Valley 3M Plan (**Appendix B**).
Potential Residual Impacts
• As described in Section 3.3, Water Resources, there is a potential reduction in the surface discharge at perennial surface water areas that cannot be avoided as well as an unavoidable long-term reduction in groundwater discharge to ET areas. The objectives of the COM Plan include avoiding adverse impacts to listed species and critical habitat and avoiding, minimizing, or mitigating adverse impacts to habitat for wildlife. Successful implementation of ACMs and monitoring and mitigation recommendations would likely reduce adverse effects on terrestrial wildlife species and their groundwater dependent habitats at some locations. However, it is not possible to determine the level of impact reduction at this time. Residual effects on some terrestrial wildlife habitats and local populations of species could exist considering the regional scale of pumping. Groundwater dependent habitat types would decline in extent and/or productivity in some locations and local populations of species that use the habitat in these locations would likely decline as well.

3.6.2.10 Alternative A

Groundwater Development Area

As compared to the Proposed Action, Alternative A considers the same groundwater development areas in the five groundwater development basins (Snake, Spring, Delamar, Dry Lake, and Cave valleys), but would require fewer future facilities within those areas given the reduced volume of water proposed. Construction of well pads, access roads, gathering pipelines, and electrical service lines would result in a total surface disturbance of approximately 2,069 to 4,814 acres. A portion of this construction disturbance – approximately 66 percent or 1,370 to 3,171 acres – would be permanently converted to industrial uses for the operational life of the project. No specific development plans are available as they cannot be prepared at this time. As a result, it is assumed that the habitat cover types would be affected in proportion to their relative surface area within the groundwater development areas (**Table 3.5-9**, Vegetation Resources). Consequently, it is expected that sagebrush shrubland, greasewood/saltbush shrubland, and Mojave mixed desert shrubland habitat types would be most extensively disturbed.

The species within the various groundwater development areas are the same as described for the Proposed Action (e.g. percent of groundwater development areas that are various species' habitat). The types of impacts to terrestrial wildlife that would result from construction and facility maintenance in groundwater development areas would be similar to the impacts described in the ROW areas (Section 3.6.2.4.1) including impacts related to habitat fragmentation and potential impacts from accidental wildfires and power lines. As compared to the Proposed Action, Alternative A could disturb approximately 43 percent fewer acres during construction and convert approximately 43 percent fewer acres to permanent facilities, while the same terrestrial wildlife species could be impacted, the extent of potential impacts would be less.

Groundwater Pumping

Alternative A would consist of reduced quantity pumping (114,755 afy) at distributed locations in Snake, Spring, Delamar, Dry Lake, and Cave valleys. Alternative A pumping could result in reductions in groundwater dependent terrestrial wildlife habitat and affect terrestrial wildlife species.

Groundwater pumping would have the potential to impact important habitats for wildlife including perennial springs and streams and their associated vegetation communities (e.g. wetlands, riparian areas, wet meadows) and phreatophytic wetland/meadow and basin shrubland vegetation types in ET areas. The degree of impacts to wildlife resources would depend on a number of variables, such as the existing habitat values and level of use, species'

sensitivity (i.e. level of dependency on groundwater dependent habitats), and the extent of the anticipated water and habitat reductions/shifts. Given the limited amount of these habitat types within the study area, it is assumed that species dependent on these areas are currently at carrying capacity. As a result, any individuals displaced as a result of reduction in amount or quality of these habitats could be lost, concentrating the remaining animals within smaller habitat areas. Species groups likely affected by reduction in groundwater dependent habitats would include: big game, small mammals, upland game birds, waterfowl, nongame birds (e.g. raptors and passerines), bats, reptiles, and invertebrates.

The effects and conclusions of groundwater development on terrestrial wildlife are provided in **Table 3.6-18** along with ACMs and proposed mitigation.

Table 3.6-18 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative A Groundwater Pumping

Effects/Conclusions
• Alternative A pumping impacts to big game and other management concern species as well as special status species would be similar to those described in the Proposed Action, but the extent of impacts may be reduced given the reduced pumping volumes (**Appendix F**, **Figures F3.3.8A-4** through **F3.3.8A-6**). There are two important bird areas with springs or streams where impacts to flow could occur (D.E. Moore and GBNP) at the full build out plus 75 years and plus 200 years time frames. • Based on model results, Alternative A pumping is not anticipated to impact Lower Meadow Valley Wash basin or perennial stream, which are important to yellow-billed cuckoo and has southwestern willow flycatcher habitat, nor is it anticipated to impact Pahranagat Valley perennial streams or springs used by these two species. • At the full build out time frame and within PPH and PGH for greater sage-grouse, ET basin shrubland as well as perennial streams are in areas that may be impacted by drawdown in Spring Valley. In the full build out plus 75 years time frame, 3 basins have ET vegetation types, springs or perennial stream segments in areas at potential risk within this habitat. By full build out plus 200 years, 5 basins contain these potentially affected habitats based on groundwater model results. Potential pumping impacts, when combined with potential groundwater development surface impacts, could result in the reduction or even loss of some local sage-grouse populations in Cave, Snake, and Spring valleys.
BLM RMP Direction and ACMs
• Acquire real property or water rights that are dedicated to the recovery of special status species within their current and historic habitat range (ACM C.2.1). • Improve late brood-rearing habitat for sage-grouse at the Stonehouse and Larson parcels on the SNWA Robison Ranch property in north Spring Valley, by use of gabion structures to expand and enhance riparian meadow habitat (ACM C.2.2). • Assist the BLM with pinyon-juniper control and sagebrush habitat improvement projects in suitable areas in the project-development basins (including Spring, Snake, and Cave valleys) and with secondary opportunities in non-project development basins (including Lake and White River valleys) (ACM C.2.3). • Conduct large-scale seeding to assist with vegetation transitions from phreatophytic communities in Spring and Snake valleys, to benefit wildlife (ACM C.2.5). • Conduct wetlands-area restoration at Big Springs and Pruess lakes in Snake Valley, to enhance habitat for bald eagle, migratory birds, greater sandhill crane, and long billed curlew (ACM C.2.7). • Work with NDOW and private land owners at and downstream of Hiko, Crystal, and Ash Springs, as allowed, in Pahranagat Valley to conduct habitat restoration and remove nonnative species to benefit Hiko White River springfish, White River springfish, and Pahranagat roundtail chub (ACM C.2.9). Habitat restoration activities could also benefit southwestern willow flycatcher and yellow-billed cuckoo. • Work with the irrigation district in Pahranagat Valley to develop system efficiencies and manage water releases to benefit native fish (ACM C.2.10). Water efficiency and releases can also be managed to benefit native wildlife. • Work with USFWS and NDOW to improve and/or expand southwestern willow flycatcher habitat on Pahranagat NWR and Key Pittman WMA, respectively (ACM C.2.11 and ACM C.2.12). • Assist the BLM with habitat-enhancement projects in Rainbow Canyon of Lower Meadow Valley Wash, to improve conditions for southwestern willow flycatchers and yellow-billed cuckoo (ACM C.2.14). • Reduce or change grazing in wet meadows, to improve habitat for migratory birds, waterfowl, shore bird, sage-grouse, raptors, and bats in the BLM grazing allotments on which SNWA holds grazing permits (ACM C.2.18). • Conduct facilitated recharge projects to offset local groundwater drawdown, to benefit sensitive biological areas (ACM C.2.21).

Table 3.6-18 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative A Groundwater Pumping (Continued)

Impact Indicators by Model Timeframe
• **Full Build Out**. Spring Valley has small amounts of all three groundwater dependent habitat types (i.e. perennial streams, springs, or ET vegetation types) in areas that may be potentially impacted. Less than 1 percent of perennial stream miles, less than 1 percent of springs, and small percentages of ET wetland meadow (1 percent) and basin shrubland (8 percent) in the valley are in areas that may be potentially affected (**Appendix F**, **Table F3.6-10**; **Figure F3.3.8A-4**, and **Figure 3.5-7**, Section 3.5, Vegetation Resources). • **Full Build Out Plus 75 Years**. Three valleys have one or more of the three groundwater dependent habitats in areas that may be potentially impacted at the full build out plus 75 years time frame. Thirteen percent of perennial stream miles in Spring Valley and 25 percent in Snake Valley are in areas that may be potentially affected. Springs in 3 valleys are in areas that could be impacted during this time frame including Spring, Snake, and Hamlin. These potentially impacted springs make up 1 percent of springs in Hamlin Valley and up to 8 percent of the springs in Spring Valley. ET vegetation types are potentially impacted in two additional valleys (Snake and Hamlin) as compared to the full build out time frame and the percent of ET wetland meadow and basin shrubland in areas that may be potentially impacted in Spring Valley increases to 20 percent and 49 percent, respectively (**Appendix F**, **Table F3.6-10**; **Figure F3.3.8A-5**, and **Figure 3.5-7**, Vegetation Resources). • **Full Build Out Plus 200 Years**. Six valleys have one or more of the three groundwater dependent habitat types in areas that may be potentially impacted at the full build out plus 200 years time frame. Four valleys have streams in areas where flows could be potentially affected including Spring, Snake, Steptoe, and Lake valleys. These potentially impacted stream miles make up 3 percent of stream miles in Steptoe Valley to up to 28 percent of stream miles in Snake Valley. The potentially impacted springs are found in 6 valleys, adding Cave, Lake, and Steptoe Valley to those named for the previous time frames above. Percent of potentially impacted springs range from less than 1 percent in Steptoe Valley to 13 percent in Spring Valley. ET vegetation types are potentially impacted in one additional valley (Lake). The percent of ET wetland meadow and basin shrubland potentially impacted in Spring Valley increases to 23 percent and 53 percent, respectively, over the previous time frame. Snake and Hamlin valleys also show increases in the amount of ET vegetation types that may be impacted (**Appendix F**, **Table F3.6-10**; **Figure F3.3.8A-6**, and **Figure 3.5-7**, Vegetation Resources).
COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures including ACMs and mitigation recommendations for wildlife resources are summarized below.
BLM RMP Direction and ACMs
• Implement biological and hydrologic monitoring, management, and mitigation, as required by the Spring Valley Stipulation (ACM C.1.1), the Biological Monitoring Plan for the Spring Valley Stipulation (Biological Work Group 2011), and the Spring Valley Hydrologic Monitoring and Mitigation Plan (Hydrographic Area 184) (SNWA 2009b). • Consider alternative withdrawal points from Shoshone Ponds, as part of the Spring Valley Stipulated Agreement (ACM C.1.3). • Monitor groundwater levels at agreed-upon monitoring wells in the Spring Valley and Hamlin Valley basins, as required by the Spring Valley Stipulation (ACM C.1.8). • Maintain a discharge monitoring site at Big Springs and Cleve Creeks, with regular public reporting (ACM C.1.16). • Ensure continued groundwater monitoring at agreed-upon monitoring wells, to characterize the movement of groundwater from the Delamar, Dry Lake, and Cave basins to adjacent basins (White River, Pahroc, and Pahranagat valleys), as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.31). • Implement biological monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42) and the Biological Monitoring Plan for the Delamar, Dry Lake, and Cave Stipulation (BRT 2011). Monitor sage-grouse breeding and late brood-rearing habitat that is groundwater dependent, as well as water-dependent ecosystems on the valley floors, as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42). • Monitor selected sites for special status species and their habitat in Pahranagat Valley (Pahranagat NWR, Key Pittman WMA, and Ash, Crystal, and Hiko springs) and White River Valley (Hot Creek, Flag, Moorman, and Hardy springs and phreatophytic habitats that support special status species in the Middle and Lower White River Valley, including Kirch WMA), per the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42). • Follow Candidate Conservation Agreements with Assurances for the greater sage-grouse and pygmy rabbit on SNWA private properties (to be provided when completed) (Appendix E, Section C.1. (Measures from SNWA Agreements). • Implement hydrologic monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation and the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (SNWA 2009c). • Reduce or cease groundwater withdrawals. Reduction or cessation of pumping would be determined on a case-by-case basis for individual production wells or well field using technical and consultation processes indentified in the stipulated agreements.

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Table 3.6-18 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative A Groundwater Pumping (Continued)

Monitoring Recommendations
• **GW-WL-9 (Greater sage-grouse monitoring in Hamlin Valley)**, and **GW-WL-10 (GW Monitoring on BLM Lands within Greater sage-grouse habitat)**, described for the Proposed Action, would be applied to Alternative A. • Other monitoring measures, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)**, **GW-VEG-3 (Wetlands Monitoring)**, **GW-VEG-4 (Phreatophytic Vegetation Monitoring)**, and **GW-VEG-5 (Swamp Cedar Monitoring)**, would be relevant to Terrestrial Wildlife (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).
Mitigation Recommendations
• **GW-WL-8 (Artificial Water Sources for Big Game)**, as described for the Proposed Action, would be applied to Alternative A. • In order to minimize or mitigation potential effects if monitoring shows impacts to greater sage-grouse or to its habitat from SNWA's groundwater pumping **GW-WR-7 (Groundwater Development and Drawdown Effects to Federal Resources and Federal Water Rights)** also is recommended. Another monitoring measure relevant to Terrestrial Wildlife includes: **GW-WR-5 (Shoshone Ponds)** (see Water Resources, Section 3.3, for complete wording of GW-WR-5 and GW-WR-7). • Mitigation planning also could be developed as part of the Snake Valley 3M Plan (**Appendix B**).
Potential Residual Impacts
• As described in Section 3.3, Water Resources, there is a potential reduction in the surface discharge at perennial surface water areas that cannot be avoided as well as an unavoidable long-term reduction in groundwater discharge to ET areas. The objectives of the COM Plan include avoiding adverse impacts to listed species and critical habitat and avoiding, minimizing, or mitigating adverse impacts to habitat for wildlife. Successful implementation of ACMs and monitoring and mitigation recommendations would likely reduce adverse effects on terrestrial wildlife species and their groundwater dependent habitats at some locations. However, it is not possible to determine the level of impact reduction at this time. Residual effects on some terrestrial wildlife habitats and local populations of species could exist considering the regional scale of pumping. Groundwater dependent habitat types would decline in extent and/or productivity in some locations and local populations of species that use the habitat in these locations would likely decline as well.

3.6.2.11 Alternative B

Groundwater Development Area

As compared to the Proposed Action, this alternative considers points of diversion rather than groundwater development areas in the five groundwater development basins (Snake, Spring, Delamar, Dry Lake, and Cave valleys). Construction of well pads, access roads, gathering pipelines, and electrical service lines would result in a total surface disturbance of approximately 4,664 acres. A portion of this construction disturbance – approximately 66 percent or 3,077 acres – would be permanently converted to industrial uses for the operational life of the project. No specific development plans are available as they cannot be prepared at this time. As a result, it is assumed that the habitat cover types would be affected in proportion to their relative surface area within 1 mile of the points of diversion within the 5 groundwater development basins. Consequently, it is expected that sagebrush shrubland, greasewood/saltbush shrubland, and pinyon juniper woodland habitat types would be most extensively disturbed.

Alternative B would disturb approximately 45 percent fewer acres during construction and convert approximately 45 percent fewer acres to permanent facilities than the Proposed Action when the estimated maximum potential acreage for the two alternatives is compared. The percent of groundwater development areas that are various species' habitat is presented in **Appendix F**, **Table F3.6-6**. The types of impacts from construction and facility maintenance on terrestrial wildlife in groundwater development areas would be similar to the impacts described in the ROW areas (Section 3.6.2.4.1) including impacts related to habitat fragmentation and potential impacts from accidental wildfires and power lines.

Species impacts are similar to those discussed for the Proposed Action; however, because Alternative B concentrates facility construction to the points of diversion, the acreage impact is less and therefore, species impacts could be less overall (**Appendix F**, **Table F3.6-6**). Given the smaller size of the points of diversion as compared to the groundwater development areas, avoiding important species habitats within the points of diversion through facility siting decisions may be more difficult. Some key differences in potential wildlife impacts between Alternative B and the Proposed Action are:

- Mule deer crucial summer and winter ranges are not found within proposed points of diversion in Dry Lake Valley in this alternative; crucial summer range is not found within the points of diversion in Cave Valley. Desert bighorn sheep occupied habitat is not found within proposed points of diversion in Delamar or Dry Lake valleys; and
- There are 2 active greater sage-grouse leks within proposed points of diversion and 14 active leks within 4 miles. No greater sage-grouse habitat is found within points of diversion in Dry Lake Valley in this alternative.

Groundwater Pumping

Alternative B would consist of full quantity pumping (176,655 afy) at or near points of diversion in Snake, Spring, Delamar, Dry Lake, and Cave valleys. Alternative B pumping could result in reductions in groundwater dependent terrestrial wildlife habitat and affect terrestrial species.

Groundwater pumping would have the potential to impact important habitats for wildlife including perennial springs and streams and their associated vegetation communities (e.g. wetlands, riparian areas, wet meadows) and phreatophytic wetland/meadow and basin shrubland vegetation types in ET areas. The degree of impacts to wildlife resources would depend on a number of variables, such as the existing habitat values and level of use, species' sensitivity (i.e. level of dependency on groundwater dependent habitats), and the extent of the anticipated water and habitat reductions/shifts. Given the limited amount of these habitat types within the study area, it is assumed that species dependent on these areas are currently at carrying capacity. As a result, any individuals displaced as a result of reduction in amount or quality of these habitats could be lost, concentrating the remaining animals within smaller habitat areas. Species groups likely affected by reduction in groundwater dependent habitats would include: big game, small mammals, upland game birds, waterfowl, nongame birds (e.g. raptors and passerines), bats, reptiles, and invertebrates

The effects and conclusions of groundwater development on terrestrial wildlife resources are provided in **Table 3.6.19** along with ACMs and proposed mitigation.

Table 3.6-19 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative B Groundwater Pumping

Effects/Conclusions
• Pumping impacts to big game and other management concern species as well as special status species would be similar to those described in the Proposed Action, but the distribution of impacts on the landscape would vary (**Appendix F**, **Figures F3.3.8A-7** through **F3.3.8-9**). There are two important bird areas with springs or streams where impacts to flow could occur (D.E. Moore and GBNP) at the full build out plus 75 years time frame, and an additional two important bird areas (Lower Meadow Valley Wash and Pahranagat Valley Complex) would be impacted at the plus 200 years time frame. • Based on model results, Alternative B pumping may potentially impact perennial streams in Lower Meadow Valley Wash as well as in Pahranagat Valley in the full build out plus 200 years time frame. Impacts in Pahranagat Valley could reduce available breeding habitat for the southwestern willow flycatcher and in Lower Meadow Valley Wash could reduce habitat. Potential impact in these two valleys could reduce foraging habitat for yellow-billed cuckoo. • At the full build out time frame and within PPH and PGH for greater sage-grouse, ET wetland/meadow and basin shrubland as well as springs and perennial streams are in areas that may be impacted by drawdown in Spring Valley. In the full build out plus 75 years time frame, four basins have ET vegetation types, springs or perennial stream segments in areas at potential risk within this habitat. By full build out plus 200 years, five basins contain these potentially affected habitats based on groundwater model results. Potential pumping impacts, when combined with potential groundwater development surface impacts, could result in the reduction or even loss of some local sage-grouse populations in Cave, Snake, and Spring valleys.
BLM RMP Direction and ACMs
• Ensure continued groundwater monitoring at agreed-upon monitoring wells, to characterize the movement of groundwater from the Delamar, Dry Lake, and Cave basins to adjacent basins (White River, Pahroc, and Pahranagat valleys), as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.31). • Implement biological monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42) and the Biological Monitoring Plan for the Delamar, Dry Lake, and Cave Stipulation (BRT 2011). Monitor sage-grouse breeding and late brood-rearing habitat that is groundwater dependent, as well as water-dependent ecosystems on the valley floors, as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42). • Monitor selected sites for special status species and their habitat in Pahranagat Valley (Pahranagat NWR, Key Pittman WMA, and Ash, Crystal, and Hiko springs) and White River Valley (Hot Creek, Flag, Moorman, and Hardy springs and phreatophytic habitats that support special status species in the Middle and Lower White River Valley, including Kirch WMA), per the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42).

Table 3.6-19 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative B Groundwater Pumping (Continued)

BLM RMP Direction and ACMs
• Follow Candidate Conservation Agreements with Assurances for the greater sage-grouse and pygmy rabbit on SNWA private properties (to be provided when completed) (Appendix E, Section C.1. (Measures from SNWA Agreements). • Implement hydrologic monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation and the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (SNWA 2009c). • Reduce or cease groundwater withdrawals. Reduction or cessation of pumping would be determined on a case-by-case basis for individual production wells or well field using technical and consultation processes indentified in the stipulated agreements. • Acquire real property or water rights that are dedicated to the recovery of special status species within their current and historic habitat range (ACM C.2.1). • Improve late brood-rearing habitat for sage-grouse at the Stonehouse and Larson parcels on the SNWA Robison Ranch property in north Spring Valley, by use of gabion structures to expand and enhance riparian meadow habitat (ACM C.2.2). • Assist the BLM with pinyon-juniper control and sagebrush habitat improvement projects in suitable areas in the project-development basins (including Spring, Snake, and Cave valleys) and with secondary opportunities in non-project development basins (including Lake and White River valleys) (ACM C.2.3). • Conduct large-scale seeding to assist with vegetation transitions from phreatophytic communities in Spring and Snake valleys, to benefit wildlife (ACM C.2.5). • Conduct wetlands-area restoration at Big Springs and Pruess lakes in Snake Valley, to enhance habitat for bald eagle, migratory birds, greater sandhill crane, and long billed curlew (ACM C.2.7). • Work with NDOW and private land owners at and downstream of Hiko, Crystal, and Ash Springs, as allowed, in Pahranagat Valley to conduct habitat restoration and remove nonnative species to benefit Hiko White River springfish, White River springfish, and Pahranagat roundtail chub (ACM C.2.9). Habitat restoration activities could also benefit southwestern willow flycatcher and yellow-billed cuckoo. • Work with the irrigation district in Pahranagat Valley to develop system efficiencies and manage water releases to benefit native fish (ACM C.2.10). Water efficiency and releases can also be managed to benefit native wildlife. • Work with USFWS and NDOW to improve and/or expand southwestern willow flycatcher habitat on Pahranagat NWR and Key Pittman WMA, respectively (ACM C.2.11 and ACM C.2.12). • Assist the BLM with habitat-enhancement projects in Rainbow Canyon of Lower Meadow Valley Wash, to improve conditions for southwestern willow flycatchers and yellow-billed cuckoo (ACM C.2.14). • Reduce or change grazing in wet meadows, to improve habitat for migratory birds, waterfowl, shore bird, sage-grouse, raptors, and bats in the BLM grazing allotments on which SNWA holds grazing permits (ACM C.2.18). • Conduct facilitated recharge projects to offset local groundwater drawdown, to benefit sensitive biological areas (ACM C.2.21).
Impact Indicators by Model Timeframe
• **Full Build Out**. Spring Valley has small amounts of all three groundwater dependent habitat types (i.e. perennial streams, springs, or ET vegetation types) in areas that may be potentially impacted. Less than 1 percent of perennial stream miles, less than 1 percent of springs, and small percentages of ET wetland meadow (1 percent) and basin shrubland (8 percent) in the valley are in areas that may be potentially affected (**Appendix F**, **Table F3.6-10**; **Figure F3.3.8A-4**, and **Figure 3.5-7**, Section 3.5, Vegetation Resources). • **Full Build Out Plus 75 Years**. Three valleys have one or more of the three groundwater dependent habitats in areas that may be potentially impacted at the full build out plus 75 years time frame. Thirteen percent of perennial stream miles in Spring Valley and 25 percent in Snake Valley are in areas that may be potentially affected. Springs in 3 valleys are in areas that could be impacted during this time frame including Spring, Snake, and Hamlin. These potentially impacted springs make up 1 percent of springs in Hamlin Valley and up to 8 percent of the springs in Spring Valley. ET vegetation types are potentially impacted in two additional valleys (Snake and Hamlin) as compared to the full build out time frame and the percent of ET wetland meadow and basin shrubland in areas that may be potentially impacted in Spring Valley increases to 20 percent and 49 percent, respectively (**Appendix F**, **Table F3.6-10**; **Figure F3.3.8A-5**, and **Figure 3.5-7**, Vegetation Resources). • **Full Build Out Plus 200 Years**. Six valleys have one or more of the three groundwater dependent habitat types in areas that may be potentially impacted at the full build out plus 200 years time frame. Four valleys have streams in areas where flows could be potentially affected including Spring, Snake, Steptoe, and Lake valleys. These potentially impacted stream miles make up 3 percent of stream miles in Steptoe Valley to up to 28 percent of stream miles in Snake Valley. The potentially impacted springs are found in 6 valleys, adding Cave, Lake, and Steptoe Valley to those named for the previous time frames above. Percent of potentially impacted springs range from less than 1 percent in Steptoe Valley to 13 percent in Spring Valley. ET vegetation types are potentially impacted in one additional valley (Lake). The percent of ET wetland meadow and basin shrubland potentially impacted in Spring Valley increases to 23 percent and 53 percent, respectively, over the previous time frame. Snake and Hamlin valleys also show increases in the amount of ET vegetation types that may be impacted (**Appendix F3.6, Table F3.6-10**; **Figure F3.3.8A-6**, and **Figure 3.5-7**, Vegetation Resources).

Table 3.6-19 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative B Groundwater Pumping (Continued)

COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures including ACMs and mitigation recommendations for wildlife resources are summarized below.
BLM RMP Direction and ACMs
• Implement biological and hydrologic monitoring, management, and mitigation, as required by the Spring Valley Stipulation (ACM C.1.1), the Biological Monitoring Plan for the Spring Valley Stipulation (Biological Work Group 2011), and the Spring Valley Hydrologic Monitoring and Mitigation Plan (Hydrographic Area 184) (SNWA 2009b). • Consider alternative withdrawal points from Shoshone Ponds, as part of the Spring Valley Stipulated Agreement (ACM C.1.3). • Monitor groundwater levels at agreed-upon monitoring wells in the Spring Valley and Hamlin Valley basins, as required by the Spring Valley Stipulation (ACM C.1.8). • Maintain a discharge monitoring site at Big Springs and Cleve Creeks, with regular public reporting (ACM C.1.16).
Monitoring Recommendations
• **GW-WL-9 (Greater sage-grouse monitoring in Hamlin Valley)**, and **GW-WL-10 (GW Monitoring on BLM Lands within Greater sage-grouse habitat)**, described for the Proposed Action, would be applied to Alternative B. • Other monitoring measures, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)**, **GW-VEG-3 (Wetlands Monitoring)**, **GW-VEG-4 (Phreatophytic Vegetation Monitoring)**, and **GW-VEG-5 (Swamp Cedar Monitoring)**, would be relevant to Terrestrial Wildlife (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).
Mitigation Recommendations
• **GW-WL-8 (Artificial Water Sources for Big Game)**, as described for the Proposed Action, would be applied to Alternative B. • In order to minimize or mitigation potential effects if monitoring shows impacts to greater sage-grouse or to its habitat from SNWA's groundwater pumping **GW-WR-7 (Groundwater Development and Drawdown Effects to Federal Resources and Federal Water Rights)** also is recommended. Another monitoring measure relevant to Terrestrial Wildlife includes: **GW-WR-5 (Shoshone Ponds)** (see Water Resources, Section 3.3, for complete wording of GW-WR-5 and GW-WR-7). • Mitigation planning also could be developed as part of the Snake Valley 3M Plan (**Appendix B**).
Potential Residual Impacts
• As described in Section 3.3, Water Resources, there is a potential reduction in the surface discharge at perennial surface water areas that cannot be avoided as well as an unavoidable long-term reduction in groundwater discharge to ET areas. The objectives of the COM Plan include avoiding adverse impacts to listed species and critical habitat and avoiding, minimizing, or mitigating adverse impacts to habitat for wildlife. Successful implementation of ACMs and monitoring and mitigation recommendations would likely reduce adverse effects on terrestrial wildlife species and their groundwater dependent habitats at some locations. However, it is not possible to determine the level of impact reduction at this time. Residual effects on some terrestrial wildlife habitats and local populations of species could exist considering the regional scale of pumping. Groundwater dependent habitat types would decline in extent and/or productivity in some locations and local populations of species that use the habitat in these locations would likely decline as well.

3.6.2.12 Alternative C

Groundwater Development Area

As compared to the Proposed Action, Alternative C considers the same groundwater development areas in the five groundwater development basins (Snake, Spring, Delamar, Dry Lake, and Cave valleys), but would require fewer future facilities within those areas given the reduced volume of water pumped (intermittent pumping up to same amount as Alternative A). Construction of well pads, access roads, gathering pipelines, and electrical service lines would result in a total surface disturbance of approximately 2,069 to 4,814 acres. A portion of this construction disturbance – approximately 66 percent or 1,370 to 3,171 acres – would be permanently converted to industrial uses for the operational life of the project. No specific development plans are available as they cannot be prepared at this time. As a result, it is assumed that the habitat cover types would be affected in proportion to their relative surface area within the groundwater development areas (**Table 3.5-3**, Vegetation Resources). Consequently, it is expected that sagebrush shrubland, greasewood/saltbush shrubland, and Mojave mixed desert shrubland habitat types would be most extensively disturbed.

The species and species habitat within the various groundwater development areas are the same as described for the Proposed Action. The percent of groundwater development areas that are various species' habitat is presented in **Appendix F, Table F3.6-5**. The types of impacts to terrestrial wildlife that would result from construction and facility maintenance in groundwater development areas would be similar to the impacts described in the ROW areas (Section 3.6.2.4.1) including impacts related to habitat fragmentation and potential impacts from accidental wildfires and power lines. When compared to the Proposed Action, Alternative C (like A) could disturb approximately 43 percent fewer acres during construction and convert approximately 43 percent fewer acres to permanent facilities. While the same terrestrial wildlife species could be impacted, the extent of potential impacts would be less.

Groundwater Pumping

Alternative C would consist of intermittent pumping (between 12,000 to 114,755 afy) at distributed locations in Snake, Spring, Delamar, Dry Lake, and Cave valleys based on a conceptual drought scenario. Alternative C pumping could result in reductions in groundwater dependent terrestrial wildlife habitat and affect terrestrial species.

Groundwater pumping would have the potential to impact important habitats for wildlife including perennial springs and streams and their associated vegetation communities (e.g. wetlands, riparian areas, wet meadows) and phreatophytic wetland/meadow and basin shrubland vegetation types in ET areas. The degree of impacts to wildlife resources would depend on a number of variables, such as the existing habitat values and level of use, species' sensitivity (i.e. level of dependency on groundwater dependent habitats), and the extent of the anticipated water and habitat reductions/shifts. Given the limited amount of these habitat types within the study area, it is assumed that species dependent on these areas are currently at carrying capacity. As a result, any individuals displaced as a result of reduction in amount or quality of these habitats could be lost, concentrating the remaining animals within smaller habitat areas. Species groups likely affected by reduction in groundwater dependent habitats would include: big game, small mammals, upland game birds, waterfowl, nongame birds (e.g. raptors and passerines), bats, reptiles, and invertebrates.

The effects and conclusions of groundwater development on terrestrial wildlife are provided in **Table 3.6-20** along with ACMs and proposed mitigation.

Table 3.6-20 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative C Groundwater Pumping

Effects/Conclusions
• Alternative C pumping impacts to big game and other management concern species as well as special status species would be similar to those described in the Proposed Action, but the extent of impacts may be reduced given the reduced pumping volumes and intermittent pumping regime (**Appendix F, Figures F3.3.8A-10** through **F3.3.8A-12**). There are two important bird areas with springs or streams where impacts to flow could occur (D.E. Moore and GBNP) at the full build out plus 200 years time frame. • Based on model results, Alternative C is not anticipated to impact Lower Meadow Valley Wash basin or perennial stream which are important to southwestern willow flycatcher and yellow-billed cuckoo nor is it anticipated to impact Pahranagat Valley perennial streams or springs used by these two species. • At the full build out time frame and within PPH and PGH for greater sage-grouse, ET basin shrubland as well as perennial streams are in areas that may be impacted by drawdown in Spring Valley. In the full build out plus 75 years time frame, three basins have ET vegetation types, springs or perennial stream segments at potential risk within this habitat. By full build out plus 200 years, greater impacts to habitats in these three basins would be anticipated based on groundwater model results. Potential pumping impacts, when combined with potential groundwater development surface impacts, could result in the reduction or even loss of some local sage-grouse populations in Snake and Spring valleys.

Table 3.6-20 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative C Groundwater Pumping (Continued)

Impact Indicators by Model Timeframe

- **Full Build Out**. Spring Valley has all three groundwater dependent habitat types (i.e. perennial streams, springs, and ET vegetation types) in areas that may be potentially impacted. Less than one pereent of perennial stream miles in Spring Valley [184] are in areas that may be potentially impacted. Three springs in Spring Valley occur in areas that could be impacted during this time frame. A small pereentage of ET wetland meadow (1 percent) and basin shrubland (8 percent) are in areas that may be potentially affected in Spring Valley (Appendix F, Table F3.6-12; Figure F3.3.8A-10, and Figure 3.5 9, Vegetation Resources).
- **Full Build Out Plus 75 Years**. Three valleys have one or more of the three groundwater dependent habitats in areas that may be potentially impacted at the full build out plus 75 years time frame. Two percent of perennial stream miles in Spring and 15 percent in Snake valleys are in areas that may be potentially impacted. Springs in three valleys occur in areas that could be impacted during this time frame including Spring, Hamlin, and Snake. These potentially impaeted springs make up less than 1 pereent of springs in Hamlin Valley and up to 5 percent of the springs in Spring Valley. ET vegetation types are potentially impacted in Spring and Snake valleys. Six percent of ET wetland meadow and 16 pereent of basin shrubland in Spring eould be potentially impacted. In Snake Valley, 22 percent of wetland meadow and 8 percent of basin shrubland could be potentially impaeted (**Appendix F**, **Table F3.6-12**; **Figure F3.3.8A-11**, and **Figure 3.5-9**, Vegetation Resourees).
- **Full Build Out Plus 200 Years**. Three valleys have one or more of the three groundwater dependent habitat types in areas that may be potentially impacted at the full build out plus 200 years time frame. No additional valleys have streams in areas that may be potentially affected, though 25 pereent of stream miles in Snake Valley are in areas where impaets to flow could occur. The potentially impacted springs are found in the same three valleys mentioned in the previous time frame. ET vegetation types are potentially impacted in Spring, Snake, and Hamlin valleys. The pereent of ET wetland meadow and basin shrubland potentially impacted in Spring Valley increases to 13 pereent and 18 percent, respeetively, over the previous time frame. Snake Valley also shows increases in the amount of ET vegetation types that may be impacted (**Appendix F**, **Table F3.6-12**; **Figure F3.3.8A-12**, and **Figure 3.5-9**, Vegetation Resourees).

COM Plan

- The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Aetions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures including ACMs and mitigation recommendations for wildlife resources are summarized below.

BLM RMP Direction and ACMs

- Implement biological and hydrologic monitoring, management, and mitigation, as required by the Spring Valley Stipulation (ACM C.1.1), the Biologieal Monitoring Plan for the Spring Valley Stipulation (Biologieal Work Group 2011), and the Spring Valley Hydrologie Monitoring and Mitigation Plan (Hydrographic Area 184) (SNWA 2009b).
- Consider alternative withdrawal points from Shoshone Ponds, as part of the Spring Valley Stipulated Agreement (ACM C.1.3).
- Monitor groundwater levels at agreed-upon monitoring wells in the Spring Valley and Hamlin Valley basins, as required by the Spring Valley Stipulation (ACM C.1.8).
- Maintain a diseharge monitoring site at Big Springs and Cleve Creeks, with regular publie reporting (ACM C.1.16).
- Ensure eontinued groundwater monitoring at agreed-upon monitoring wells, to characterize the movement of groundwater from the Delamar, Dry Lake, and Cave basins to adjaeent basins (White River, Pahroc, and Pahranagat valleys), as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.31).
- Implement biologieal monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42) and the Biological Monitoring Plan for the Delamar, Dry Lake, and Cave Stipulation (BRT 2011). Monitor sage-grouse breeding and late brood-rearing habitat that is groundwater dependent, as well as water-dependent eeosystems on the valley floors, as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42).
- Monitor seleeted sites for speeial status speeies and their habitat in Pahranagat Valley (Pahranagat NWR, Key Pittman WMA, and Ash, Crystal, and Hiko springs) and White River Valley (Hot Creek, Flag, Moorman, and Hardy springs and phreatophytie habitats that support speeial status speeies in the Middle and Lower White River Valley, including Kirch WMA), per the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42).
- Follow Candidate Conservation Agreements with Assurances for the greater sage-grouse and pygmy rabbit on SNWA private properties (to be provided when completed) (Appendix E, Seetion C.1. (Measures from SNWA Agreements).
- Implement hydrologic monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation and the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (SNWA 2009e).
- Reduce or eease groundwater withdrawals. Reduetion or cessation of pumping would be determined on a case-by-case basis for individual production wells or well field using teehnieal and consultation processes indentified in the stipulated agreements.

Table 3.6-20 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative C Groundwater Pumping (Continued)

BLM RMP Direction and ACMs

- Aequire real property or water rights that are dedieated to the recovery of speeial status speeies within their eurrent and historie habitat range (ACM C.2.1).
- Improve late brood-rearing habitat for sage-grouse at the Stonehouse and Larson pareels on the SNWA Robison Raneh property in north Spring Valley, by use of gabion struetures to expand and enhanee riparian meadow habitat (ACM C.2.2).
- Assist the BLM with pinyon-juniper eontrol and sagebrush habitat improvement projeets in suitable areas in the projeet-development basins (ineluding Spring, Snake, and Cave valleys) and with seeondary opportunities in non-project development basins (ineluding Lake and White River valleys) (ACM C.2.3).
- Conduct large-seale seeding to assist with vegetation transitions from phreatophytie eommunities in Spring and Snake valleys, to benefit wildlife (ACM C.2.5).
- Conduct wetlands-area restoration at Big Springs and Pruess lakes in Snake Valley, to enhanee habitat for bald eagle, migratory birds, greater sandhill erane, and long billed eurlew (ACM C.2.7).
- Work with NDOW and private land owners at and downstream of Hiko, Crystal, and Ash Springs, as allowed, in Pahranagat Valley to eonduet habitat restoration and remove nonnative speeies to benefit Hiko White River springfish, White River springfish, and Pahranagat roundtail chub (ACM C.2.9). Habitat restoration aetivities eould also benefit southwestern willow flyeateher and yellow-billed cuekoo.
- Work with the irrigation distriet in Pahranagat Valley to develop system effieieneies and manage water releases to benefit native fish (ACM C.2.10). Water effieieney and releases ean also be managed to benefit native wildlife.
- Work with USFWS and NDOW to improve and/or expand southwestern willow flyeateher habitat on Pahranagat NWR and Key Pittman WMA, respeetively (ACM C.2.11 and ACM C.2.12).
- Assist the BLM with habitat-enhaneement projeets in Rainbow Canyon of Lower Meadow Valley Wash, to improve eonditions for southwestern willow flyeatehers and yellow-billed cuekoo (ACM C.2.14).
- Reduee or ehange grazing in wet meadows, to improve habitat for migratory birds, waterfowl, shore bird, sage-grouse, raptors, and bats in the BLM grazing allotments on whieh SNWA holds grazing permits (ACM C.2.18).
- Conduet faeilitated reeharge projeets to offset loeal groundwater drawdown, to benefit sensitive biologieal areas (ACM C.2.21).

Monitoring Recommendations

- **GW-WL-9 (Greater sage-grouse monitoring in Hamlin Valley)**, and **GW-WL-10 (GW Monitoring on BLM Lands within Greater sage-grouse habitat)**, deseribed for the Proposed Aetion, would be applied to Alternative C.
- Other monitoring measures, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)**, **GW-VEG-3 (Wetlands Monitoring)**, **GW-VEG-4 (Phreatophytic Vegetation Monitoring)**, and **GW-VEG-5 (Swamp Cedar Monitoring)**, would be relevant to Terrestrial Wildlife (see Water Resourees, Seetion 3.3, for eomplete wording of GW-WR-3a).

Mitigation Recommendations

- **GW-WL-8 (Artificial Water Sources for Big Game)**, as deseribed for the Proposed Aetion, would be applied to Alternative C.
- In order to minimize or mitigation potential effeets if monitoring shows impaets to greater sage-grouse or to its habitat from SNWA's groundwater pumping **GW-WR-7 (Groundwater Development and Drawdown Effects to Federal Resources and Federal Water Rights)** also is reeommended. Another monitoring measure relevant to Terrestrial Wildlife ineludes: **GW-WR-5 (Shoshone Ponds)** (see Water Resourees, Seetion 3.3, for eomplete wording of GW-WR-5 and GW-WR-7).
- Mitigation planning also eould be developed as part of the Snake Valley 3M Plan (**Appendix B**).

Potential Residual Impacts

- As deseribed in Seetion 3.3, Water Resourees, there is a potential reduetion in the surface discharge at perennial surfaee water areas that eannot be avoided as well as an unavoidable long-term reduetion in groundwater diseharge to ET areas. The objeetives of the COM Plan inelude avoiding adverse impaets to listed speeies and eritieal habitat and avoiding, minimizing, or mitigating adverse impacts to habitat for wildlife. Sueeessful implementation of ACMs and monitoring and mitigation reeommendations would likely reduee adverse effeets on terrestrial wildlife speeies and their groundwater dependent habitats at some loeations. However, it is not possible to determine the level of impaet reduetion at this time. Residual effeets on some terrestrial wildlife habitats and loeal populations of speeies eould exist eonsidering the regional seale of pumping. Groundwater dependent habitat types would decline in extent and/or produetivity in some loeations and loeal populations of speeies that use the habitat in these loeations would likely deeline as well.

3.6.2.13 Alternative D

Groundwater Development Area

As compared to the Proposed Action and Alternative D considers the same groundwater development areas in Cave, Delamar, and Dry Lake valleys and only the southern portion of groundwater development areas in Spring Valley (within Lincoln County). Construction of well pads, access roads, gathering pipelines, and electrical service lines would result in a total surface disturbance of approximately 2,513 to 4,005 acres. A portion of this construction disturbance – approximately 66 percent or 1,655 to 2,635 acres – would be permanently converted to industrial uses for the operational life of the project. No specific development plans are available as they cannot be prepared at this time. As a result, it is assumed that the habitat cover types would be affected in proportion to their relative surface area within the groundwater development areas (**Table 3.5-10**, Vegetation Resources). Consequently, it is expected that sagebrush shrubland and greasewood/saltbush shrubland habitat types would be most extensively disturbed.

The species and species habitat within the various groundwater development areas are the same as described for the Proposed Action except there would not be impacts from construction and maintenance of future facilities in Snake Vailey and northern Spring Valley (north of Lincoln County). The percent of groundwater development areas that are various species' habitat is presented in **Appendix F**, **Table F3.6-7**. The types of impacts to terrestrial wildlife that would result from construction and facility maintenance in groundwater development areas would be similar to the impacts described in the ROW areas (Section 3.6.2.4.1) including impacts related to habitat fragmentation and potential impacts from accidental wildfires and power lines. As compared to the Proposed Action, Alternative D could disturb between 30 and 52 percent fewer acres overall during construction and convert between 30 and 52 percent fewer acres to permanent facilities. While the same terrestrial wildlife species could be impacted in Spring, Delamar, Dry Lake, and Cave (south of White Pine County line) valleys, the extent of potential impacts would be less than the Proposed Action in those valleys.

Some key differences in potential wildlife impacts between Alternative D and the Proposed Action are listed below:

- Pronghorn crucial winter range is not found within groundwater development areas in southern Spring Valley;
- There are 3 active greater sage-grouse leks within proposed groundwater development areas and 9 active leks within 4 miles; and
- The known occurrence of baking powder flat blue butterfly in the Baking Powder Flat ACEC is no longer within proposed groundwater development areas as it is north of the Lincoln County line.

Groundwater Pumping

Alternative D would consist of reduced pumping (78,755 afy) at distributed locations in southern Spring, Delamar, Dry Lake, and Cave valleys. No pumping would occur in Snake Valley. Alternative D pumping could result in reductions in groundwater dependent terrestrial wildlife habitat and affect terrestrial wildlife species.

- Groundwater pumping would have the potential to impact important habitats for wildlife including perennial springs and streams and their associated vegetation communities (e.g. wetlands, riparian areas, wet meadows) and phreatophytic wetland/meadow and basin shrubland vegetation types in ET areas. The degree of impacts to wildlife resources would depend on a number of variables, such as the existing habitat values and level of use, species' sensitivity (i.e. level of dependency on groundwater dependent habitats), and the extent of the anticipated water and habitat reductions/shifts. Given the limited amount of these habitat types within the study area, it is assumed that species dependent on these areas are currently at carrying capacity. As a result, any individuals displaced as a result of reduction in amount or quality of these habitats could be lost, concentrating the remaining animals within smaller habitat areas. Species groups likely affected by reduction in groundwater dependent habitats would include: big game, small mammals, upland game birds, waterfowl, nongame birds (e.g. raptors and passerines), bats, reptiles, and invertebrates.

The effects and conclusions of groundwater development on terrestrial wildlife are provided in **Table 3.6-21** along with ACMs and proposed mitigation.

Table 3.6-21 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative D Groundwater Pumping

Effects/Conclusions
• Alternative D pumping impacts to big game and other management concern species as well as special status species would be similar to those described in the Proposed Action, but the distribution of impacts on the landscape would vary given that pumping facilities would be located south of the White Pine County line (**Appendix F3.3**, **Figures F3.3.8A-13** through **F3.3.8-15**). There is one important bird area with springs or streams where impacts to flow could occur (GBNP) at the full build out plus 200 years time frame. • Based on model results, Alternative D is not anticipated to impact Lower Meadow Valley Wash basin or perennial stream, which are important to southwestern willow flycatcher and yellow-billed cuckoo nor is it anticipated to impact Pahranagat Valley perennial streams or springs used by these two species. • At the full build out time frame and within PPH and PGH for greater sage-grouse, one spring is in an area that may be impacted by drawdown in Hamlin Valley. In the full build out plus 75 years time frame, four basins have ET vegetation types, springs or perennial stream segments in areas at potential risk within this habitat. By full build out plus 200 years, six basins contain these potentially affected habitats based on groundwater model results. Potential pumping impacts, when combined with potential groundwater development surface impacts, could result in the reduction or even loss of some local sage-grouse populations in Cave, Snake, and Spring valleys.
BLM RMP Direction and ACMs
• Conduct large-scale seeding to assist with vegetation transitions from phreatophytic communities in Spring and Snake valleys, to benefit wildlife (ACM C.2.5). • Conduct wetlands-area restoration at Big Springs and Pruess lakes in Snake Valley, to enhance habitat for bald eagle, migratory birds, greater sandhill crane, and long billed curlew (ACM C.2.7). • Work with NDOW and private land owners at and downstream of Hiko, Crystal, and Ash Springs, as allowed, in Pahranagat Valley to conduct habitat restoration and remove nonnative species to benefit Hiko White River springfish, White River springfish, and Pahranagat roundtail chub (ACM C.2.9). Habitat restoration activities could also benefit southwestern willow flycatcher and yellow-billed cuckoo. • Work with the irrigation district in Pahranagat Valley to develop system efficiencies and manage water releases to benefit native fish (ACM C.2.10). Water efficiency and releases can also be managed to benefit native wildlife. • Work with USFWS and NDOW to improve and/or expand southwestern willow flycatcher habitat on Pahranagat NWR and Key Pittman WMA, respectively (ACM C.2.11 and ACM C.2.12). • Assist the BLM with habitat-enhancement projects in Rainbow Canyon of Lower Meadow Valley Wash, to improve conditions for southwestern willow flycatchers and yellow-billed cuckoo (ACM C.2.14). • Reduce or change grazing in wet meadows, to improve habitat for migratory birds, waterfowl, shore bird, sage-grouse, raptors, and bats in the BLM grazing allotments on which SNWA holds grazing permits (ACM C.2.18). • Conduct facilitated recharge projects to offset local groundwater drawdown, to benefit sensitive biological areas (ACM C.2.21).
Impact Indicators by Model Timeframe
• **Full Build Out**. Only Hamlin Valley has one of the three groundwater dependent habitat types (i.e. one spring) in areas that may be potentially impacted. This potentially impacted spring represents less than 1 percent of the springs in Hamlin Valley (**Appendix F**, **Table F3.6-13**; **Figure F3.3.8A-13**, and **Figure 3.5-10**, Vegetation Resources). • **Full Build Out Plus 75 Years**. Five valleys have one or more of the three groundwater dependent habitats in areas that may be potentially impacted at the full build out plus 75 years time frame. There are three valleys with perennial streams where impacts to flow could occur. Five percent of perennial stream miles in Spring, 22 percent in Lake, and less than 1 percent in Snake valleys are in areas that could be potentially impacted. Springs in five valleys could be impacted during this time frame including Spring [valleys 201 and 184], Hamlin, Lake, and Snake valleys. These potentially impacted springs make up less than 1 percent of springs in Snake Valley and up to 11 percent of the springs in Lake Valley. ET vegetation types are in areas that may be potentially impacted in three valleys (Spring, Snake, and Hamlin). Eleven percent of wetland meadow and 10 percent of basin shrubland are in areas that could be potentially impacted in Spring Valley. Sixty-eight percent of wetland meadow and 73 percent of basin shrubland are in areas that could be potentially impacted in Hamlin Valley (**Appendix F3.6**, **Table F3.6-13**; **Figure F3.3.8A-14**, and **Figure 3.5-10**, Vegetation Resources).

Table 3.6-21 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative D Groundwater Pumping (Continued)

Impact Indicators by Model Timeframe
• **Full Build Out Plus 200 Years**. Eight valleys have one or more of the three groundwater dependent habitat types in areas that may be potentially impacted at the full build out plus 200 years time frame. Five valleys have streams in areas where flows may be potentially affected including the three named above as well as Spring [184] and Hamlin valleys. The potentially impacted springs are found in 8 valleys, adding Cave, Steptoe, and Patterson valleys to those named above. One additional valley (Lake) has ET vegetation types in areas that may be potentially impacted in this time frame. The percent of ET wetland meadow and basin shrubland in areas that may be potentially impacted in Spring Valley is 18 percent and 23 percent, respectively, in this time frame. Snake and Hamlin valleys also show increases in the amount of ET vegetation types that may be impacted. Ninety-one percent of wetland meadow and 78 percent of basin shrubland are in areas that could be potentially impacted in Lake Valley in this time frame. (**Appendix F3.6**, **Table F3.6-13**; **Figure F3.3.8A 15**, and **Figure 3.5-10**, Vegetation Resources).
COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures including ACMs and mitigation recommendations for wildlife resources are summarized below.
BLM RMP Direction and ACMs
• Implement biological and hydrologic monitoring, management, and mitigation, as required by the Spring Valley Stipulation (ACM C.1.1), the Biological Monitoring Plan for the Spring Valley Stipulation (Biological Work Group 2011), and the Spring Valley Hydrologic Monitoring and Mitigation Plan (Hydrographic Area 184) (SNWA 2009b). • Consider alternative withdrawal points from Shoshone Ponds, as part of the Spring Valley Stipulated Agreement (ACM C.1.3). • Monitor groundwater levels at agreed-upon monitoring wells in the Spring Valley and Hamlin Valley basins, as required by the Spring Valley Stipulation (ACM C.1.8). • Maintain a discharge monitoring site at Big Springs and Cleve Creeks, with regular public reporting (ACM C.1.16). • Ensure continued groundwater monitoring at agreed-upon monitoring wells, to characterize the movement of groundwater from the Delamar, Dry Lake, and Cave basins to adjacent basins (White River, Pahroc, and Pahranagat valleys), as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.31). • Implement biological monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42) and the Biological Monitoring Plan for the Delamar, Dry Lake, and Cave Stipulation (BRT 2011). Monitor sage-grouse breeding and late brood-rearing habitat that is groundwater dependent, as well as water-dependent ecosystems on the valley floors, as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42). • Monitor selected sites for special status species and their habitat in Pahranagat Valley (Pahranagat NWR, Key Pittman WMA, and Ash, Crystal, and Hiko springs) and White River Valley (Hot Creek, Flag, Moorman, and Hardy springs and phreatophytic habitats that support special status species in the Middle and Lower White River Valley, including Kirch WMA), per the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42). • Follow Candidate Conservation Agreements with Assurances for the greater sage-grouse and pygmy rabbit on SNWA private properties (to be provided when completed) (Appendix E, Section C.1. (Measures from SNWA Agreements). • Implement hydrologic monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation and the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (SNWA 2009c). • Reduce or cease groundwater withdrawals. Reduction or cessation of pumping would be determined on a case-by-case basis for individual production wells or well field using technical and consultation processes indentified in the stipulated agreements. • Acquire real property or water rights that are dedicated to the recovery of special status species within their current and historic habitat range (ACM C.2.1). • Improve late brood-rearing habitat for sage-grouse at the Stonehouse and Larson parcels on the SNWA Robison Ranch property in north Spring Valley, by use of gabion structures to expand and enhance riparian meadow habitat (ACM C.2.2). • Assist the BLM with pinyon-juniper control and sagebrush habitat improvement projects in suitable areas in the project-development basins (including Spring, Snake, and Cave valleys) and with secondary opportunities in non-project development basins (including Lake and White River valleys) (ACM C.2.3).

Table 3.6-21 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative D Groundwater Pumping (Continued)

Monitoring Recommendations
• **GW-WL-9 (Greater sage-grouse monitoring in Hamlin Valley)**, and **GW-WL-10 (GW Monitoring on BLM Lands within Greater sage-grouse habitat)**, described for the Proposed Action, would be applied to Alternative D. • Other monitoring measures, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)**, **GW-VEG-3 (Wetlands Monitoring)**, **GW-VEG-4 (Phreatophytic Vegetation Monitoring)**, and **GW-VEG-5 (Swamp Cedar Monitoring)**, would be relevant to Terrestrial Wildlife (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).
Mitigation Recommendations
• **GW-WL-8 (Artificial Water Sources for Big Game)**, as described for the Proposed Action, would be applied to Alternative D. • In order to minimize or mitigation potential effects if monitoring shows impacts to greater sage-grouse or to its habitat from SNWA's groundwater pumping **GW-WR-7 (Groundwater Development and Drawdown Effects to Federal Resources and Federal Water Rights)** also is recommended. Another monitoring measure relevant to Terrestrial Wildlife includes: **GW-WR-5 (Shoshone Ponds)** (see Water Resources, Section 3.3, for complete wording of GW-WR-3a and GW-WR-7). • Mitigation planning also could be developed as part of the Snake Valley 3M Plan (**Appendix B**).
Potential Residual Impacts
• As described in Section 3.3, Water Resources, there is a potential reduction in the surface discharge at perennial surface water areas that cannot be avoided as well as an unavoidable long-term reduction in groundwater discharge to ET areas. The objectives of the COM Plan include avoiding adverse impacts to listed species and critical habitat and avoiding, minimizing, or mitigating adverse impacts to habitat for wildlife. Successful implementation of ACMs and monitoring and mitigation recommendations would likely reduce adverse effects on terrestrial wildlife species and their groundwater dependent habitats at some locations. However, it is not possible to determine the level of impact reduction at this time. Residual effects on some terrestrial wildlife habitats and local populations of species could exist considering the regional scale of pumping. Groundwater dependent habitat types would decline in extent and/or productivity in some locations and local populations of species that use the habitat in these locations would likely decline as well.

3.6.2.14 Alternative E

Groundwater Development Area

As compared to the Proposed Action, this alternative considers the same groundwater development areas in only four groundwater development basins (Spring, Delamar, Dry Lake, and Cave valleys). Construction of well pads, access roads, gathering pipelines, and electrical service lines would result in a total surface disturbance of approximately 1,754 to 4,079 acres. A portion of this construction disturbance – approximately 66 percent or 1,158 to 2,683 acres – would be permanently converted to industrial uses for the operational life of the project. No specific development plans are available as they cannot be prepared at this time. As a result, it is assumed that the habitat cover types would be affected in proportion to their relative surface area within the groundwater development areas (**Table 3.5-11**, Vegetation Resources). Consequently, it is expected that sagebrush shrubland and greasewood/saltbush shrubland habitat types would be most extensively disturbed.

The species and species habitat within the various groundwater development areas are the same as described for the Proposed Action except that Snake Valley would not be impacted by construction and maintenance of future facilities. The percent of groundwater development areas that are various species' habitat is presented in **Appendix F**, **Table F3.6-8**. The types of impacts to terrestrial wildlife that would result from construction and facility maintenance in groundwater development areas would be similar to the impacts described in the ROW areas (Section 3.6.2.4.1) including impacts related to habitat fragmentation and potential impacts from accidental wildfires and power lines. Compared to the Proposed Action, Alternative E could disturb approximately 52 percent fewer acres overall during construction and convert approximately 52 percent fewer acres to permanent facilities. While the same terrestrial wildlife species could be impacted Spring, Delamar, Dry Lake, and Cave valleys, the extent of potential impacts would be less than the Proposed Action in those valleys.

The species and species habitat within the various groundwater development areas are the same as described for the Proposed Action except that Snake Valley would not be impacted by construction and maintenance of future facilities. The types of impacts to terrestrial wildlife that would result from construction and facility maintenance in groundwater development areas would be similar to the impacts described in the ROW areas (Section 3.6.2.4.1) including impacts

related to habitat fragmentation and potential impacts from accidental wildfires and power lines. Given that Alternative E could disturb approximately 52 percent fewer acres overall during construction and convert approximately 52 percent fewer acres to permanent facilities, while the same terrestrial wildlife species could be impacted Spring, Delamar, Dry Lake, and Cave valleys, the extent of potential impacts would be less than the Proposed Action in those valleys (**Appendix F, Table F3.6-8**).

Some key differences in potential wildlife impacts between this alternative and the Proposed Action are listed below:

- Because Snake Valley is not included in the alternative, all big game ranges in this valley discussed in the Proposed Action groundwater development section would not be impacted (e.g. mule deer crucial summer range and rocky mountain bighorn sheep occupied habitat); and
- There are 12 active greater sage-grouse leks within proposed groundwater development areas and 19 active leks within 4 miles; no sage-grouse habitats would be impacted in Snake Valley.

Groundwater Pumping

Alternative E would consist of reduced pumping (78,755 afy) at distributed locations in Spring, Delamar, Dry Lake, and Cave valleys. No pumping would occur in Snake Valley. Alternative E pumping could result in reductions in groundwater dependent terrestrial wildlife habitat and affect terrestrial wildlife species.

Groundwater pumping would have the potential to impact important habitats for wildlife including perennial springs and streams and their associated vegetation communities (e.g. wetlands, riparian areas, wet meadows) and phreatophytic wetland/meadow and basin shrubland vegetation types in ET areas. The degree of impacts to wildlife resources would depend on a number of variables, such as the existing habitat values and level of use, species' sensitivity (i.e. level of dependency on groundwater dependent habitats), and the extent of the anticipated water and habitat reductions/shifts. Given the limited amount of these habitat types within the study area, it is assumed that species dependent on these areas are currently at carrying capacity. As a result, any individuals displaced as a result of reduction in amount or quality of these habitats could be lost, concentrating the remaining animals within smaller habitat areas. Species groups likely affected by reduction in groundwater dependent habitats would include: big game, small mammals, upland game birds, waterfowl, nongame birds (e.g. raptors and passerines), bats, reptiles, and invertebrates.

The effects and conclusions of groundwater development on terrestrial wildlife are provided in **Table 3.6-22** along with ACMs and proposed mitigation.

Table 3.6-22 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative E Groundwater Pumping

Effects/Conclusions
• Alternative E pumping impacts to big game and other management concern species as well as special status species would be similar to those described in the Proposed Action, but the distribution of impacts on the landscape would vary given that pumping facilities would not be located in Snake Valley (**Appendix F3.3**, **Figures F3.3.8A-16** through **F3.3.8A-18**). There are no important bird areas with springs or streams where impacts to flow could occur at any of the three model time frames. • Based on groundwater flow model results, this alternative is not anticipated to impact Lower Meadow Valley Wash basin or perennial streams, which are important to southwestern willow flycatcher and yellow-billed cuckoo nor is it anticipated to impact Pahranagat Valley perennial streams or springs used by these two species. • At the full build out time frame and within PPH and PGH for greater sage-grouse, ET basin shrubland as well as perennial streams are in areas that may be impacted by drawdown in Spring Valley. In the full build out plus 75 years time frame, two basins have ET vegetation types, springs or perennial stream segments in areas at potential risk within these two habitat ranges. By full build out plus 200 years, four basins contain these potentially affected habitats based on groundwater model results. Potential pumping impacts, when combined with potential groundwater development surface impacts, could result in the reduction or even loss of some local sage-grouse populations in Cave and Spring valleys.

Table 3.6-22 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative E Groundwater Pumping (Continued)

Impact Indicators by Model Timeframe

- **Full Build Out**. Spring Valley has all three groundwater dependent habitat types (i.e. perennial streams, springs, and ET vegetation types) in areas that may be potentially impacted. Less than one percent of perennial stream miles in Spring Valley may potentially be impacted. Less than 1 percent of the springs in Spring Valley could be impacted during this time frame. A small percentage of ET wetland meadow (1 percent) and basin shrubland (8 percent) are potentially affected in Spring Valley (**Appendix F3.3**, **Table F3.6 15**; **Figure F3.3.8A-16**, and **Figure 3.5-11**, Vegetation Resources).
- **Full Build Out Plus 75 Years**. Two valleys have one or more of the three groundwater dependent habitats in areas that may be potentially impacted at the full build out plus 75 years time frame. There is one valley with perennial streams where impacts to flow could occur. Three percent of perennial stream miles in Spring Valley could potentially be impacted. Springs in two valleys are in areas that could be impacted during this time frame. These potentially impacted springs make up less than 1 percent of springs in Hamlin Valley and up to 8 percent of the springs in Spring Valley. ET vegetation types are potentially impacted in 2 valleys (Spring and Hamlin). Twenty percent of ET wetland meadow and 49 percent of basin shrubland could potentially be impacted in Spring Valley. In Hamlin Valley, 2 percent of wetland meadow and 6 percent of basin shrubland could potentially be impacted (**Appendix F3.6**, **Table F3.6-15**; **Figure F3.3.8A-17**, and **Figure 3.5-11**, Vegetation Resources).
- **Full Build Out Plus 200 Years**. Six valleys have one or more of the three groundwater dependent habitat types in areas that may be potentially impacted at the full build out plus 200 years time frame. Four valleys have streams in areas that could potentially be impacted, including Spring, Snake, Steptoe, and Lake valleys. The potentially impacted springs are found in five valleys, adding Cave, Lake, and Steptoe valleys to those named above. ET vegetation types are potentially impacted in one additional valley (Lake). The percent of ET wetland meadow and basin shrubland potentially impacted in Spring Valley increases to 22 percent and 53 percent, respectively, over the previous time frame. Hamlin and Lake valleys also show increases in the amount of ET vegetation types that may be impacted (**Appendix F3.6**, **Table F3.6-15**; **Figure F3.3.8A-18**, and **Figure 3.5-11**, Vegetation Resources).

COM Plan

- The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures including ACMs and mitigation recommendations for wildlife resources are summarized below.

BLM RMP Direction and ACMs

- Implement biological and hydrologic monitoring, management, and mitigation, as required by the Spring Valley Stipulation (ACM C.1.1), the Biological Monitoring Plan for the Spring Valley Stipulation (Biological Work Group 2011), and the Spring Valley Hydrologic Monitoring and Mitigation Plan (Hydrographic Area 184) (SNWA 2009b).
- Consider alternative withdrawal points from Shoshone Ponds, as part of the Spring Valley Stipulated Agreement (ACM C.1.3).
- Monitor groundwater levels at agreed-upon monitoring wells in the Spring Valley and Hamlin Valley basins, as required by the Spring Valley Stipulation (ACM C.1.8).
- Maintain a discharge monitoring site at Big Springs and Cleve Creeks, with regular public reporting (ACM C.1.16).
- Ensure continued groundwater monitoring at agreed-upon monitoring wells, to characterize the movement of groundwater from the Delamar, Dry Lake, and Cave basins to adjacent basins (White River, Pahroc, and Pahranagat valleys), as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.31).
- Implement biological monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42) and the Biological Monitoring Plan for the Delamar, Dry Lake, and Cave Stipulation (BRT 2011). Monitor sage-grouse breeding and late brood-rearing habitat that is groundwater dependent, as well as water-dependent ecosystems on the valley floors, as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42).
- Monitor selected sites for special status species and their habitat in Pahranagat Valley (Pahranagat NWR, Key Pittman WMA, and Ash, Crystal, and Hiko springs) and White River Valley (Hot Creek, Flag, Moorman, and Hardy springs and phreatophytic habitats that support special status species in the Middle and Lower White River Valley, including Kirch WMA), per the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42).
- Follow Candidate Conservation Agreements with Assurances for the greater sage-grouse and pygmy rabbit on SNWA private properties (to be provided when completed) (Appendix E, Section C.1. (Measures from SNWA Agreements).
- Implement hydrologic monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation and the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (SNWA 2009c).
- Reduce or cease groundwater withdrawals. Reduction or cessation of pumping would be determined on a case-by-case basis for individual production wells or well field using technical and consultation processes indentified in the stipulated agreements.

Table 3.6-22 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative E Groundwater Pumping (Continued)

BLM RMP Direction and ACMs

- Acquire real property or water rights that are dedicated to the recovery of special status species within their current and historic habitat range (ACM C.2.1).
- Improve late brood-rearing habitat for sage-grouse at the Stonehouse and Larson parcels on the SNWA Robison Ranch property in north Spring Valley, by use of gabion structures to expand and enhance riparian meadow habitat (ACM C.2.2).Assist the BLM with pinyon-juniper control and sagebrush habitat improvement projects in suitable areas in the project-development basins (including Spring, Snake, and Cave valleys) and with secondary opportunities in non-project development basins (including Lake and White River valleys) (ACM C.2.3).
- Conduct large-scale seeding to assist with vegetation transitions from phreatophytic communities in Spring and Snake valleys, to benefit wildlife (ACM C.2.5).
- Conduct wetlands-area restoration at Big Springs and Pruess lakes in Snake Valley, to enhance habitat for bald eagle, migratory birds, greater sandhill crane, and long billed curlew (ACM C.2.7).
- Work with NDOW and private land owners at and downstream of Hiko, Crystal, and Ash Springs, as allowed, in Pahranagat Valley to conduct habitat restoration and remove nonnative species to benefit Hiko White River springfish, White River springfish, and Pahranagat roundtail chub (ACM C.2.9). Habitat restoration activities could also benefit southwestern willow flycatcher and yellow-billed cuckoo.
- Work with the irrigation district in Pahranagat Valley to develop system efficiencies and manage water releases to benefit native fish (ACM C.2.10). Water efficiency and releases can also be managed to benefit native wildlife.
- Work with USFWS and NDOW to improve and/or expand southwestern willow flycatcher habitat on Pahranagat NWR and Key Pittman WMA, respectively (ACM C.2.11 and ACM C.2.12).
- Assist the BLM with habitat-enhancement projects in Rainbow Canyon of Lower Meadow Valley Wash, to improve conditions for southwestern willow flycatchers and yellow-billed cuckoo (ACM C.2.14).
- Reduce or change grazing in wet meadows, to improve habitat for migratory birds, waterfowl, shore bird, sage-grouse, raptors, and bats in the BLM grazing allotments on which SNWA holds grazing permits (ACM C.2.18).
- Conduct facilitated recharge projects to offset local groundwater drawdown, to benefit sensitive biological areas (ACM C.2.21).

Monitoring Recommendations

- **GW-WL-9 (Greater sage-grouse monitoring in Hamlin Valley)** and **GW-WL-10 (GW Monitoring on BLM Lands within Greater sage-grouse habitat)**, described for the Proposed Action, would be applied to Alternative E.
- Other monitoring measures, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)**, **GW-VEG-3 (Wetlands Monitoring)**, **GW-VEG-4 (Phreatophytic Vegetation Monitoring)**, and **GW-VEG-5 (Swamp Cedar Monitoring)**, would be relevant to terrestrial wildlife (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

Mitigation Recommendations

- **GW-WL-8 (Artificial Water Sources for Big Game)**, as described for the Proposed Action, would be applied to Alternative E.
- In order to minimize or mitigation potential effects if monitoring shows impacts to greater sage-grouse or to its habitat from SNWA's groundwater pumping **GW-WR-7 (Groundwater Development and Drawdown Effects to Federal Resources and Federal Water Rights)** also is recommended. Another monitoring measure relevant to Terrestrial Wildlife includes: **GW-WR-5 (Shoshone Ponds)** (see Water Resources, Section 3.3, for complete wording of GW-WR-5 and GW-WR-7).
- Mitigation planning also could be developed as part of the Snake Valley 3M Plan (**Appendix B**).

Potential Residual Impacts

- As described in Section 3.3, Water Resources, there is a potential reduction in the surface discharge at perennial surface water areas that cannot be avoided as well as an unavoidable long-term reduction in groundwater discharge to ET areas. The objectives of the COM Plan include avoiding adverse impacts to listed species and critical habitat and avoiding, minimizing, or mitigating adverse impacts to habitat for wildlife. Successful implementation of ACMs and monitoring and mitigation recommendations would likely reduce adverse effects on terrestrial wildlife species and their groundwater dependent habitats at some locations. However, it is not possible to determine the level of impact reduction at this time. Residual effects on some terrestrial wildlife habitats and local populations of species could exist considering the regional scale of pumping. Groundwater dependent habitat types would decline in extent and/or productivity in some locations and local populations of species that use the habitat in these locations would likely decline as well.

3.6.2.15 Alternative F

Groundwater Development Area

As compared to the Proposed Action, this alternative considers the same groundwater development areas in only four groundwater development basins (Spring, Delamar, Dry Lake, and Cave valleys). Construction of well pads, access roads, gathering pipelines, and electrical service lines would result in a total surface disturbance of approximately 2,698 to 6,629 acres. A portion of this construction disturbance – approximately 66 percent or 1,782 to 4,359 acres – would be permanently converted to industrial uses for the operational life of the project. No specific development plans are available as they cannot be prepared at this time. As a result, it is assumed that the habitat cover types would be affected in proportion to their relative surface area within the groundwater development areas (**Table 3.5-3**, Vegetation Resources). Consequently, it is expected that sagebrush shrubland and greasewood/saltbush shrubland habitat types would be most extensively disturbed.

The species and species habitat within the various groundwater development areas are the same as described for the Proposed Action except that Snake Valley would not be impacted by construction and maintenance of future facilities. The percent of groundwater development areas that are various species' habitat is presented in **Appendix F**, **Table F3.6-9**. The types of impacts to terrestrial wildlife that would result from construction and facility maintenance in groundwater development areas would be similar to the impacts described in the ROW areas (Section 3.6.2.4.1) including impacts related to habitat fragmentation and potential impacts from accidental wildfires and power lines. As compared to the Proposed Action, Alternative F could disturb approximately 24 percent fewer acres overall during construction and convert approximately 24 percent fewer acres to permanent facilities. While the same terrestrial wildlife species could be impacted Spring, Delamar, Dry Lake, and Cave valleys, the extent of potential impacts would be less than the Proposed Action in those valleys.

Some key differences in potential wildlife impacts between this alternative and the Proposed Action are listed below:

- Because Snake Valley is not included in the alternative, all big game ranges in this valley discussed in the Proposed Action groundwater development section would not be impacted (e.g. mule deer crucial summer range and rocky mountain bighorn sheep occupied habitat); and
- There are 12 active greater sage-grouse leks within proposed groundwater development areas and 19 active leks within 4 miles; no sage-grouse habitats would be impacted in Snake Valley.

Groundwater Pumping

Alternative F would consist of reduced pumping (114,129 afy) at distributed locations in Spring, Delamar, Dry Lake, and Cave valleys. No pumping would occur in Snake Valley. Alternative F pumping could result in reductions in groundwater dependent terrestrial wildlife habitat and affect terrestrial wildlife species.

Groundwater pumping would have the potential to impact important habitats for wildlife including perennial springs and streams and their associated vegetation communities (e.g. wetlands, riparian areas, wet meadows) and phreatophytic wetland/meadow and basin shrubland vegetation types in ET areas. The degree of impacts to wildlife resources would depend on a number of variables, such as the existing habitat values and level of use, species' sensitivity (i.e. level of dependency on groundwater dependent habitats), and the extent of the anticipated water and habitat reductions/shifts. Given the limited amount of these habitat types within the study area, it is assumed that species dependent on these areas are currently at carrying capacity. As a result, any individuals displaced as a result of reduction in amount or quality of these habitats could be lost, concentrating the remaining animals within smaller habitat areas. Species groups likely affected by reduction in groundwater dependent habitats would include: big game, small mammals, upland game birds, waterfowl, nongame birds (e.g. raptors and passerines), bats, reptiles, and invertebrates.

The effects and conclusions of groundwater development on terrestrial wildlife are provided in **Table 3.6-23** along with ACMs and proposed mitigation.

Table 3.6-23 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative F Groundwater Pumping

Effects/Conclusions

- Alternative F pumping impacts to big game and other management concern species as well as special status species would be similar to those described for the Proposed Action. However, the distribution of impacts on the landscape would vary given that pumping facilities would not be located in Snake Valley (**Appendix F, Figures F3.3.8A-19** through **F3.3.8A-21**). There are two important bird areas (GBNP and Pahranagat Valley Complex) with springs or streams where impacts to flow could occur in the full build out plus 200 year model time frame.
- Based on groundwater flow model results, Lower Meadow Valley Wash contains a perennial stream segment that could be impacted at the full build out plus 200 years time frame. Of the approximately 42 miles of Lower Meadow Valley Wash (stream) in Lower Meadow Valley Wash Valley, model results indicated that 8 percent of the length of the stream are in areas of risk from drawdown. Impacts in flow would depend on the actual drawdown that occurs in these areas and the site-specific hydraulic connection between the groundwater system impacted by pumping and Lower Meadow Valley Wash segment. If this stream is hydraulically connected to the groundwater system impacted by pumping and within the drawdown area, it would likely experience a reduction in baseflow that could result in changes to available riparian habitat for yellow-billed cuckoo and to southwestern willow flycatcher habitat. Model results suggest that in the full build out plus 200 years time frame, a small percent 2 percent of perennial streams in Pahranagat Valley (0.5 mile) could be impacted by project-related pumping. This valley is important to these two bird species.
- At the full build out time frame and within PPH and PGH for greater sage-grouse, ET basin shrubland as well as springs and perennial streams are in areas that may be impacted by drawdown in Spring Valley. In the full build out plus 75 years time frame, two basins have ET vegetation types, springs or perennial stream segments in areas at potential risk within these two habitat ranges. By full build out plus 200 years, four basins contain these potentially affected habitats based on groundwater model results. Potential pumping impacts, when combined with potential groundwater development surface impacts, could result in the reduction or even loss of some local sage-grouse populations in Cave and Spring valleys.

BLM RMP Direction and ACMs

- Acquire real property or water rights that are dedicated to the recovery of special status species within their current and historic habitat range (ACM C.2.1).
- Improve late brood-rearing habitat for sage-grouse at the Stonehouse and Larson parcels on the SNWA Robison Ranch property in north Spring Valley, by use of gabion structures to expand and enhance riparian meadow habitat (ACM C.2.2).
- Assist the BLM with pinyon-juniper control and sagebrush habitat improvement projects in suitable areas in the project-development basins (including Spring, Snake, and Cave valleys) and with secondary opportunities in non-project development basins (including Lake and White River valleys) (ACM C.2.3).
- Conduct large-scale seeding to assist with vegetation transitions from phreatophytic communities in Spring and Snake valleys, to benefit wildlife (ACM C.2.5).
- Conduct wetlands-area restoration at Big Springs and Pruess lakes in Snake Valley, to enhance habitat for bald eagle, migratory birds, greater sandhill crane, and long billed curlew (ACM C.2.7).
- Work with NDOW and private land owners at and downstream of Hiko, Crystal, and Ash Springs, as allowed, in Pahranagat Valley to conduct habitat restoration and remove nonnative species to benefit Hiko White River springfish, White River springfish, and Pahranagat roundtail chub (ACM C.2.9). Habitat restoration activities could also benefit southwestern willow flycatcher and yellow-billed cuckoo.
- Work with the irrigation district in Pahranagat Valley to develop system efficiencies and manage water releases to benefit native fish (ACM C.2.10). Water efficiency and releases can also be managed to benefit native wildlife.
- Work with USFWS and NDOW to improve and/or expand southwestern willow flycatcher habitat on Pahranagat NWR and Key Pittman WMA, respectively (ACM C.2.11 and ACM C.2.12).
- Assist the BLM with habitat-enhancement projects in Rainbow Canyon of Lower Meadow Valley Wash, to improve conditions for southwestern willow flycatchers and yellow-billed cuckoo (ACM C.2.14).
- Reduce or change grazing in wet meadows, to improve habitat for migratory birds, waterfowl, shore bird, sage-grouse, raptors, and bats in the BLM grazing allotments on which SNWA holds grazing permits (ACM C.2.18).
- Conduct facilitated recharge projects to offset local groundwater drawdown, to benefit sensitive biological areas (ACM C.2.21).

Table 3.6-23 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative F Groundwater Pumping (Continued)

Impact Indicators by Model Timeframe
• **Full Build Out**. Spring Valley has all three groundwater dependent habitat types (i.e. perennial streams, springs, and ET vegetation types) in areas that may be potentially impacted. Less than 1 percent of perennial stream miles in Spring Valley may potentially be impacted. Less than 1 percent of the springs in Spring Valley could be impacted during this time frame. A small percentage of ET wetland meadow (1 percent) and basin shrubland (6 percent) are potentially affected in Spring Valley (Appendix F, Table F3.6 16; Figure F3.3.8A-19, and Figure 3.5-12, Vegetation Resources). • **Full Build Out Plus 75 Years**. Two valleys have one or more of the three groundwater dependent habitats in areas that may be potentially impacted at the full build out plus 75 years time frame. There is one valley with perennial streams where impacts to flow could occur. Ten percent of perennial stream miles in Spring Valley could potentially be impacted. Springs in two valleys are in areas that could be impacted during this time frame. These potentially impacted springs make up less than 1 percent of springs in Hamlin Valley and up to 18 percent of the springs in Spring Valley. ET vegetation types are potentially impacted in two valleys (Spring and Hamlin). Twenty-five percent of ET wetland meadow and 61 percent of basin shrubland could potentially be impacted in Spring Valley. In Hamlin Valley, 1 percent of wetland meadow and 4 percent of basin shrubland could potentially be impacted (Appendix F, Table F3.6-16; Figure F3.3.8A-20, and Figure 3.5-12, Vegetation Resources). • **Full Build Out Plus 200 Years**. Seven valleys have one or more of the three groundwater dependent habitat types in areas that may be potentially impacted at the full build out plus 200 years time frame. Five valleys have streams in areas that could potentially be impacted, including Spring, Snake, Steptoe, Pahranagat, and Lake valleys. The potentially impacted springs are found in 6 valleys, Cave, Hamlin, Lake, Spring, Snake, and Steptoe valleys. ET vegetation types are potentially impacted in one additional valley (Lake). The percent of ET wetland meadow and basin shrubland potentially impacted in Spring Valley increases to 31 percent and 69 percent, respectively, over the previous time frame. Hamlin increases to 2 percent of wetland meadow and 22 percent of basin shrubland and Lake valley has 91 percent of wetland meadow and 66 percent of basin shrubland types that may be impacted (Appendix F, Table F3.6-16; Figure F3.3.8A-21, and Figure 3.5-11, Vegetation Resources).
COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures including ACMs and mitigation recommendations for wildlife resources are summarized below.
BLM RMP Direction and ACMs
• Implement biological and hydrologic monitoring, management, and mitigation, as required by the Spring Valley Stipulation (ACM C.1.1), the Biological Monitoring Plan for the Spring Valley Stipulation (Biological Work Group 2011), and the Spring Valley Hydrologic Monitoring and Mitigation Plan (Hydrographic Area 184) (SNWA 2009b). • Consider alternative withdrawal points from Shoshone Ponds, as part of the Spring Valley Stipulated Agreement (ACM C.1.3). • Monitor groundwater levels at agreed-upon monitoring wells in the Spring Valley and Hamlin Valley basins, as required by the Spring Valley Stipulation (ACM C.1.8). • Maintain a discharge monitoring site at Big Springs and Cleve Creeks, with regular public reporting (ACM C.1.16). • Ensure continued groundwater monitoring at agreed-upon monitoring wells, to characterize the movement of groundwater from the Delamar, Dry Lake, and Cave basins to adjacent basins (White River, Pahroc, and Pahranagat valleys), as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.31). • Implement biological monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42) and the Biological Monitoring Plan for the Delamar, Dry Lake, and Cave Stipulation (BRT 2011). Monitor sage-grouse breeding and late brood-rearing habitat that is groundwater dependent, as well as water-dependent ecosystems on the valley floors, as part of the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42). • Monitor selected sites for special status species and their habitat in Pahranagat Valley (Pahranagat NWR, Key Pittman WMA, and Ash, Crystal, and Hiko springs) and White River Valley (Hot Creek, Flag, Moorman, and Hardy springs and phreatophytic habitats that support special status species in the Middle and Lower White River Valley, including Kirch WMA), per the Delamar, Dry Lake, and Cave Stipulation (ACM C.1.42). • Follow Candidate Conservation Agreements with Assurances for the greater sage-grouse and pygmy rabbit on SNWA private properties (to be provided when completed) (Appendix E, Section C.1. (Measures from SNWA Agreements). • Implement hydrologic monitoring, management and mitigation as required by the Delamar, Dry Lake, and Cave Stipulation and the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (SNWA 2009c). • Reduce or cease groundwater withdrawals. Reduction or cessation of pumping would be determined on a case-by-case basis for individual production wells or well field using technical and consultation processes identified in the stipulated agreements.

Table 3.6-23 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative F Groundwater Pumping (Continued)

Monitoring Recommendations
• **GW-WL-9 (Greater sage-grouse monitoring in Hamlin Valley)**, and **GW-WL-10 (GW Monitoring on BLM Lands within Greater sage-grouse habitat)**, described for the Proposed Action, would be applied to Alternative A. • Other monitoring measures, **GW-WR-3 (Comprehensive Water Resources Monitoring Plan)**, **GW-VEG-3 (Wetlands Monitoring)**, **GW-VEG-4 (Phreatophytic Vegetation Monitoring)**, and **GW-VEG-5 (Swamp Cedar Monitoring)**, would be relevant to Terrestrial Wildlife (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).
Mitigation Recommendations
• **GW-WL-8 (Artificial Water Sources for Big Game)**, as described for the Proposed Action, would be applied to Alternative F. • In order to minimize or mitigation potential effects if monitoring shows impacts to greater sage-grouse or to its habitat from SNWA's groundwater pumping **GW-WR-7 (Groundwater Development and Drawdown Effects to Federal Resources and Federal Water Rights)** also is recommended. Another monitoring measure relevant to Terrestrial Wildlife includes: **GW-WR-5 (Shoshone Ponds)**. (See Water Resources Section 3.3.2 for complete wording of GW-WR-5 and GW-WR-7.) • Mitigation planning also could be developed as part of the Snake Valley 3M Plan (**Appendix B**).
Potential Residual Impacts
• As described in Section 3.3, Water Resources, there is a potential reduction in the surface discharge at perennial surface water areas that cannot be avoided as well as an unavoidable long-term reduction in groundwater discharge to ET areas. The objectives of the COM Plan include avoiding adverse impacts to listed species and critical habitat and avoiding, minimizing, or mitigating adverse impacts to habitat for wildlife. Successful implementation of ACMs and monitoring and mitigation recommendations would likely reduce adverse effects on terrestrial wildlife species and their groundwater dependent habitats at some locations. However, it is not possible to determine the level of impact reduction at this time. Residual effects on some terrestrial wildlife habitats and local populations of species could exist considering the regional scale of pumping. Groundwater dependent habitat types would decline in extent and/or productivity in some locations and local populations of species that use the habitat in these locations would likely decline as well.

3.6.2.16 No Action

Groundwater Development

Under the No Action Alternative, the proposed groundwater development would not occur in the five pumping basins. Therefore, terrestrial wildlife resources would not be affected by surface disturbance or facility maintenance activities.

Groundwater Pumping

No Action pumping is limited to pumping activities that are already approved. This pumping could result in reductions in terrestrial wildlife habitat and affect terrestrial species.

The effects and conclusions of groundwater development on terrestrial wildlife are provided in **Table 3.6-24** along with ACMs and proposed mitigation.

Table 3.6-24 Summary of Terrestrial Wildlife Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for No Action Groundwater Pumping

Effects/Conclusions
• No Action pumping impacts to big game and other management concern species as well as special status species would be similar to those described in the Proposed Action, but the distribution of impacts on the landscape would vary (**Appendix F**, **Figures F3.3.8A-22** through **F3.3.8A-24**). There is one important bird areas with springs or streams where impacts to flow could occur (Lower Meadow Valley Wash) at all three model time frames. • Based on model results, No Action pumping could potentially impact perennial stream flow in Lower Meadow Valley Wash in the full build out plus 75 years and full build out plus 200 years model time frames potentially impacting habitat for southwestern willow flycatcher and foraging habitat for yellow billed cuckoo. Potential pumping impacts to perennial streams or springs are not anticipated in Pahranagat or Delamar valleys, so habitat impacts to these two bird species in these valleys are not anticipated. • At the full build out time frame and within PPH and PGH for greater sage-grouse, either ET basin shrubland, springs, or perennial streams are in areas that may be impacted by drawdown in three valleys (Steptoe, White River, and Lake). In the full build out plus 75 years time frame, three basins (Dry, Spring [184], and White River) have ET vegetation types, springs or perennial stream segments at potential risk within this habitat. By full build out plus 200 years, four basins contain these potentially affected habitats based on groundwater model results within this greater sage-grouse habitat.
Impact Indicators by Model Timeframe
• **Full Build Out**. Six valleys have one or more of the three groundwater dependent habitat types (i.e. perennial streams, springs, or ET vegetation types) in areas that may be potentially impacted. There are three valleys with perennial streams where impacts to flow could occur. Less than 1 percent of perennial stream miles in Clover Valley may potentially be impacted. Approximately 18 perennial stream miles in Spring Valley [201] are located within high or moderate risk areas where impacts could occur. Springs in six valleys occur in areas where impacts could occur during this time frame including Steptoe, Lake, Patterson, Panaca, Clover, and Lower Meadow Valley Wash. These potentially impacted springs make up less than 1 percent of springs in Steptoe Valley and up to 25 percent of the springs in Patterson Valley. No wetland meadow and a small percentage of basin shrubland (23 percent in Lake and 1 percent in Panaca) are potentially affected (Appendix F, Table F3.6-17; Figure F3.3.8A-22, and Figure 3.5-13, Vegetation Resources). • **Full Build Out Plus 75 Years**. Ten valleys have one or more of the three groundwater dependent habitats in areas that may be potentially impacted at the full build out plus 75 years time frame. There are six valleys with perennial streams located in areas where impacts to flow could occur. Less than 1 percent of perennial stream miles in Spring [201] and Clover valleys, 35 percent in Panaca, 7 percent in Lower Meadow Valley Wash, 11 percent in White River, and 22 percent in Lake valleys could potentially be impacted. Springs in eight valleys could be impacted during this time frame including Lake, Patterson, Panaca, Clover, Lower Meadow Valley Wash, White River, Dry, and Spring [184]. These potentially impacted springs make up less than 1 percent of springs in Spring Valley [184] and up to 39 percent of the springs in Patterson Valley. ET vegetation types are potentially impacted in one additional valley (White River) as compared to the full build out time frame. Two percent ET wetland meadow and 3 percent of basin shrubland could potentially be impacted in White River Valley (**Appendix F**, **Table F3.6-17**; **Figure F3.3.8A-23**, and **Figure 3.5-13**, Vegetation Resources). • **Full Build Out Plus 200 Years**. Twelve valleys have one or more of the three groundwater dependent habitat types in areas that may be potentially impacted at the full build out plus 200 years time frame. Seven valleys have streams located in areas where flows could potentially be affected including the six named above as well as Spring Valley [184]. Springs located in areas where impacts could occur are found in 12 valleys, adding Las Vegas, Spring [201], and Eagle valleys to those named above. ET vegetation types are potentially impacted in two additional valleys (Clover and Spring [184] valleys). The percent of basin shrubland potentially impacted in Spring Valley [184] increases to 1 percent over the previous time frame. Lake, White River, and Clover valleys also show increases in the amount of ET vegetation types that may be impacted (**Appendix F**, **Table F3.6 17**; **Figure F3.3.8A-24**, and **Figure 3.5-13**, Vegetation Resources).

3.6.3 Cumulative Impacts

3.6.3.1 Impacts Common to All Alternatives

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Terrestrial Wildlife Resources

Recent empirical studies strongly suggest that wildlife species are already responding to recent global warming trends with significant shifts in range distribution (generally northward) and phenology (i.e., seasonal timing of biological activities) (McCarty 2001; Walther et al. 2002; Root et al. 2003). These effects include earlier breeding, changes in timing of migration, changes in breeding performance (egg size, nesting success), changes in population sizes, changes in population distributions; and changes in selection differentials between components of a population. These responses are being seen in all different types of taxa, from insects to mammals, in North America (Field et al. 2007). Research suggests that the effects of global climate change on wildlife communities in parks and protected areas may be most noticeable, not as a drastic loss of species from their current ranges, but instead as a fundamental change in community structure as species associations shift due to influxes of new species (Burns et al. 2003). This trend may also be applicable to non-reserve landscapes as well.

Several traits may make wildlife species especially susceptible to climate change (Foden et al. 2008). These traits include specialized habitat and/or microhabitat requirements; narrow environmental tolerances or thresholds that are likely to be exceeded due to climate change at any stage in the life cycle; dependence on specific environmental triggers or cues that are likely to be disrupted by climate change; dependence on inter-specific interactions that are likely to be disrupted by climate change; and a poor ability to disperse to or colonize a new or more suitable range.

Climate change, in combination with other stresses to the landscapes in the project region, is predicted to exacerbate species declines, sedimentation, species invasions, disease, and other impacts (BLM 2010). Current and proposed land use activities (e.g., development, road building, etc.) could create additional habitat fragmentation and reduce movement corridors, limiting the ability for wildlife to shift their ranges in response to climate change (BLM 2010).

Climate change could affect wildlife in the GWD Project Area by:

- Altering or restricting the physical ranges of species present;
- Altering disease dynamics and the introduction of novel pathogens;
- Modifying, shifting, or eliminating habitats; and
- Altering species' phenology.

3.6.3.2 Issues

Rights-of-way and Groundwater Development Area Construction and Maintenance

- Short-term, long-term, and permanent changes in terrestrial wildlife habitat (loss or fragmentation) and species composition due to surface disturbance as a result of construction-related activities, and operational maintenance.
- Loss of individuals, or populations of federally listed, candidate, or special status terrestrial wildlife species due to surface disturbance, related potential impacts (e.g. accidental wildfires, invasive species) and indirect effects (displacement of individuals and loss of breeding success from exposure to construction movements, noise, and higher levels of human activity including traffic).
- Compliance with recovery plans, conservation agreements, and state wildlife action plans for special status species.
- Potential effects from collisions and electrocutions to raptors and other wildlife from power lines and power stations.
- Potential effects of additional infrastructure resulting in increased perches for raptors and corvids that may increase predation on other animals.
- Potential effects on culturally significant terrestrial wildlife species traditionally used as food by regional Tribes.

Groundwater Pumping

- Short term, long term, and permanent loss of phreatophytic and riparian wildlife habitat and surface-water availability.
- Potential effects of groundwater drawdown on water resources and habitat that support migratory waterfowl, bats, and important bird areas.
- Potential effects of groundwater drawdown on wildlife associated with cave habitats.
- Compliance with recovery plans, conservation agreements, and state wildlife action plans for special status species.

3.6.3.3 Assumptions

Rights-of-way and Groundwater Development Area Construction and Maintenance

- Study Areas. The cumulative impact study areas for terrestrial wildlife species vary by species or species group based either on the basins impacted or by a recognized management unit for the species (e.g. big game management units, greater sage-grouse population management units). Given the large number of species, cumulative effects were evaluated for a selected set of species. The overall rationale for these various cumulative study areas is the need to evaluate the impacts of the various alternatives in concert with PPAs and RFFA impacts on a scale that considers movement of the various species within their typical range, management units used by agencies (where established), or the basins crossed by the proposed GWD Project.
- Time frames. The effects analysis included time frames that ranged from several days to 2 years for a short-term effect and greater than 5 years for a long-term effect.
- The PPAs footprints are based on utility ROWs and other surface disturbance activities identified in the BLM and other data bases (Chapter 2).
- The reasonably foreseeable projects and activities are those outlined in **Table 2.9-1**, Chapter 2. No cumulative effects related to surface development activities are anticipated outside the selected species or species group cumulative study area.

Groundwater Pumping

- Wildlife habitats associated with water sources include perennial streams, springs, ET wetland meadows and ET basin shrubland phreatophytes, as described in Vegetation Resources.
- Assumptions made in the vegetation section also apply to wildlife with regard to vegetation communities, see Section 3.5, Vegetation Resources.
- Assumptions made in the water section also apply to wildlife with regard to spring and perennial stream habitats, see Section 3.3, Water Resources.
- Study area. The study area is the boundary for the groundwater model simulations (**Figure 1.1-1**).
- Time frames. The effects analysis included time frames from full build out of the entire project (approximately 2050) to full build out plus 200 years.

3.6.3.4 Methodology for Analysis

Rights-of-way and Groundwater Development Area Construction and Maintenance

- The cumulative surface disturbance effects to terrestrial wildlife resources were estimated by overlaying the existing surface disturbances for PPAs, RFFAs, and the ROW development areas for the project alternative being evaluated over the various species habitats within the cumulative impact study areas (**Appendix F**, **Figures F3.6-3** to **F3.6-12**). The estimated cumulative surface disturbance was then compared with the overall amount of habitat within the cumulative impact study area. Habitat for selected species are from the NDOW GIS layers for big game and greater sage-grouse, or SWreGAP animal habitat models for other species or groups of species, and for some species groups, the entire area within a cumulative impact study area was considered habitat.
- The cumulative surface disturbance effects to special status species were estimated from evaluating the cumulative surface disturbance footprint in relation to the habitat requirements of terrestrial wildlife species to provide a risk assessment for future effects on these species.

Groundwater Pumping

- The cumulative analysis focuses on those basins with groundwater dependent terrestrial wildlife habitats (i.e. springs, perennial streams, ET vegetation types [wetland meadow/basin shrubland]) predicted to be affected by each alternative. This represents the incremental effect of the alternative on groundwater dependent terrestrial wildlife habitat in combination with other cumulative pumping actions.
- Wetland meadow and basin shrubland (terrestrial wildlife habitat type at risk from pumping). The area enclosed by the maximum extent of the 10-foot drawdown contour was superimposed over the area of the primary ET units to calculate the area of vegetation that could experience reductions in soil moisture and long-term vegetation community composition changes caused by groundwater drawdown of 10 feet or more at different points in time (full build out, full build out plus 75 years, and full build out plus 200 years). Figures were generated to illustrate the expansion of the 10-foot and greater drawdown contours over time in relation to the vegetation communities within the hydrographic ET boundaries (Section 3.5, Vegetation Resources).
- Springs and perennial streams (terrestrial wildlife habitat at risk from pumping). The 10-foot drawdown contour was applied to the springs and perennial stream reaches that were classified as being at risk from groundwater drawdown. The springs included for analysis were those rated as presenting a "high" or "moderate" risk of effects. The number of springs and miles of perennial stream reaches potentially affected were enumerated for each alternative over time from the modeling results (see Section 3.3, Water Resources).
- **Appendix F**, **Tables F3.6-18** through **F3.6-25** display the potential relative effects to groundwater dependent habitats (springs, perennial stream reaches, and ET vegetation types) as compared to the No Action Cumulative impacts. The tables show where project-specific impacts will combine with other project impacts (i.e. yellow colored cells in the tables) or show where the impacts are due only to project-specific pumping (i.e. red colored cells in the tables). Please also see the discussion in Vegetation Resources (3.5.2.8) regarding the shift in vegetation composition due to groundwater pumping. These appendix tables provide information on the groundwater dependent habitat types (include perennial streams, springs, ET wetland meadows and ET basin shrubland phreatophytes) as a percent of the total amount of that type of habitat within each of the valleys. For

example, it shows whether 5 percent of the perennial stream reaches in a valley are potentially at risk from drawdown or if 60 percent of them are at risk. This provides information on the intensity of the potential impact to wildlife species that use these habitats within the valley.

General Discussion

The following cumulative impacts discussion is based on data presented in both Sections 3.3, Water Resources and 3.5, Vegetation Resources. These sections present cumulative analysis for springs and perennial streams and impacts on ET wetland meadow and basin shrubland which are the habitat types used by terrestrial wildlife that are at risk of impacts by groundwater pumping. The wildlife pumping effects analysis builds on data presented in these two sections and their associated appendices.

3.6.3.5 No Action

Groundwater Development

Under the No Action Alternative, the proposed project would not be constructed or maintained. No project-related surface disturbance would occur. Terrestrial wildlife habitats would continue to be influenced by natural events such as drought, fire, and land use activities such as grazing and existing water diversions. Management activities on public lands will continue to be directed by the Ely and Las Vegas RMPs, which include measures to maintain habitats for terrestrial wildlife species. Management guidance for other public lands in close proximity to the project study area would be provided by Great Basin Park General Management Plan and the Forest Plan for the Humbolt-Toiyabe National Forest.

Groundwater Pumping

In general, groundwater pumping has the potential to impact important habitats for wildlife including perennial springs and streams, their associated vegetation communities (e.g. wetlands, riparian areas, wet meadows), and phreatophytic wetland/meadow and basin shrubland vegetation types in ET areas, see **Appendix F3.3.8**, **Figures F3.3.8B-19** through **B-21** for the potentially impacted perennial waters for the three pumping time frames. **Table F3.6-18** in **Appendix F** provides a summary of basins that have groundwater dependent habitat that is in areas potentially impacted by No Action cumulative drawdown in the three time frames. Perennial streams, springs, and ET wetland meadow and basin shrubland types are presented as a percent of the total available in the valley (e.g., potentially impacted springs as a percent of the total springs in the valley). The No Action cumulative scenario has 17 basins with potentially impacted perennial streams or springs by the full build out plus 200 years time frame including Pahranagat, Lower Moapa, Panaca, Clover, Lower Meadow Valley Wash, White River, Lake, Muddy River Springs Area, Spring [201 and 184], Steptoe, Patterson, Coyote Springs, Las Vegas, Eagle, Rose, and Dry valleys. See **Appendix F**, **Table F3.6-1** for species that occur in these valleys. The degree of impacts to wildlife resources would depend on a number of variables, such as the existing habitat values and level of use, species' sensitivity (i.e. level of dependency on groundwater-dependent habitats), and the extent of the anticipated water and habitat reductions/shifts. Given the limited amount of these habitat types within the study area, it is assumed that species dependent on these areas currently are at carrying capacity. As a result, any individuals displaced as a result of reduction in amount or quality of these habitats could be lost, concentrating the remaining animals within smaller habitat areas. Species groups likely affected by reduction in groundwater dependent habitats would include: big game, small mammals, upland game birds, waterfowl, nongame birds (e.g. raptors and passerines), bats, reptiles, and invertebrates. Discussion of cumulative effects for species and species groups is addressed later in the section.

3.6.3.6 Proposed Action

Groundwater Development

Rights-of-way and Groundwater Development Area Construction and Maintenance

Habitat Alteration and Direct/Indirect Effects on Terrestrial Wildlife Species

PPAs consist primarily of existing roads, energy utility corridors, mining districts, and recent wildfires (**Figures 2.9-1** and **2.9-2**). Other activities that have influenced terrestrial wildlife habitat and species include livestock grazing over the majority of public lands, the development of towns and rural communities (see Section 3.5, Vegetation Resources), and vegetation treatments conducted by various agencies. The primary future actions consist of construction of new utilities (pipelines, electrical distribution lines), roads and turbine pads for wind energy projects, and the Coyote Springs Residential Development. These projects would be located in Spring, Pahranagat, Hidden Valley (north),

Garnet, Dry Lake, Muleshoe, Lake, Delamar, and Coyote Springs valleys. The total estimated surface area disturbance for construction and maintenance of the main pipeline and ancillary facilities, plus the maximum anticipated groundwater development facilities, and RFFAs are displayed in **Table 2.9-1** for the Proposed Action. The reasonably foreseeable actions are described in **Table 2.9-1**.

Cumulative Effects. The areas where the GWD Project surface disturbance would potentially overlap with PPAs and RFFAs (**Figures 2.9-1** and **2.9-2** and **Table 2.9-1**) include existing road and highway crossings in all project hydrologic basins, the LCCRDA utility corridor that extends from southern Dry Lake Valley to the vicinity of Apex, and intersection with facilities associated with the ON Transmission Line and Eastern Nevada Transmission Project and TWE Transmission Line, the Coyote Springs Residential Development in Coyote Spring Valley, and future wind energy projects in Spring and northern Lake valleys. The additive cumulative effects would result in additional habitat disturbance and fragmentation. Fragmentation would continue until restoration is complete, which could take from 5 to 200 years depending on the vegetation type. Some areas would be permanently converted (e.g. new roads) to other uses. Habitat conversion or alteration would result in direct losses of smaller, less mobile species of wildlife such as small mammals and reptiles and displacement of more mobile species into adjacent habitats. Displacement would occur from various locations and would increase pressure on remaining habitats. This could result in some local reductions in wildlife populations, if adjacent habitats are at carrying capacity. Potential cumulative indirect impacts would include an incremental increase in noise, elevated human presence, dispersal of noxious and invasive weed species, and dust deposition if projects occurred during the same time frame within wildlife habitat. Agency implemented vegetation treatments would improve habitats over time and would be a beneficial cumulative effect.

Groundwater Pumping

PPAs are represented by the No Action pumping operations described in Section 3.3, Water Resources. The reasonably foreseeable actions are described in **Table 2.9-4**. The following discussions are based on an interpretation of the groundwater model simulations that predict groundwater drawdown elevations that have the potential to impact three groundwater dependent habitats (perennial streams, springs, and ET vegetation types) that are used by terrestrial wildlife species. The degree of impacts to terrestrial wildlife resources would depend on a number of variables, such as the existing habitat values and level of use, species' sensitivity (i.e. level of dependency on groundwater-dependent habitats), and the extent of the anticipated water and habitat reductions/shifts. Given the limited amount of these habitat types within the study area, it is assumed that species dependent on these areas currently are at carrying capacity. As a result, any individuals displaced as a result of reduction in amount or quality of these habitats could be lost, concentrating the remaining animals within smaller habitat areas. Species groups likely affected by reduction in groundwater dependent habitats would include: big game, small mammals, upland game birds, waterfowl, nongame birds (e.g. raptors and passerines), bats, reptiles, and invertebrates. Discussion of cumulative effects for species and species groups is addressed later in the section.

There are 11 valleys that have at least 1 of the 3 groundwater dependent habitats incrementally impacted by Proposed Action cumulative effects (i.e., have impacts beyond those attributable to the No Action cumulative effects) in at least one of the three model time frames; these include Spring (184), Snake, Hamlin, Lake, Lower Meadow Valley Wash, Cave, Steptoe, Muddy River Springs Area, Panaca, Spring [201], and Eagle. **Table F3.6-19, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Proposed Action cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in these valleys. Figures in Section 3.5, Vegetation Resources, display the incremental contribution of the Proposed Action cumulative to wetland/meadow and basin shrubland ET vegetation types as well as the number of springs and miles of perennial streams that are in areas potentially impacted by drawdown in selected valleys. Of these 11 valleys, 6 (Spring [184], Snake, Cave, Steptoe, Hamlin, Eagle) have all the potential incremental impacts of at least 1 groundwater dependent habitat coming entirely from the Proposed Action cumulative pumping. The other five valleys (Panaca, Lower Meadow Valley Wash, Spring [201], Muddy River Springs Area, and Pahranagat) show potential impacts based on the No Action cumulative model results to which the Proposed Action cumulative contributes incrementally. The location and risk to springs and perennial streams in relation to cumulative drawdown at the various model time frames are displayed in **Appendix F3.3.8**, **Figures F3.3.8B-01** through **F3.3.8B-03**.

Cumulative Effects of Groundwater Development and Pumping on Terrestrial Wildlife Species

Management Concern Species

Big Game: The cumulative impact study areas for big game species were developed from the hunt units and management subunit boundaries used by the States of Nevada and Utah to manage these species (**Appendix F**, **Figures F3.6-3** through **F3.6-7**). Most big game species require large areas to meet seasonal habitat requirements and move between these habitats. While the proposed project surface impacts may not impact a large percent of the overall available habitat for these species, when considered together with the PPAs and RFFAs, impacts may be detrimental to local populations. The primary source of cumulative impacts to big game is the construction of roads and other infrastructure. These facilities reduce the quantity of available habitat both directly through habitat loss as well as indirectly through fragmentation and other fragmentation effects (e.g., increased noise, elevated human presence, dispersal of noxious and invasive weeds species, dust deposition). While research suggests that roadway impacts can have population-level effects on terrestrial species (Trombulak and Frissell 2000; Fahrig and Rytwinski 2009; Benitez-Lopez et al. 2010), the thresholds at which roads or other development features create movement barriers or population-level effects are rarely known (Frair et al. 2008) and can vary from species to species.

The future groundwater facilities development along with proposed wind power projects in Dry Lake and Spring valleys and the supporting facilities and roads would likely have cumulative effects particularly on pronghorn and mule deer winter range (NV Management units 11 and 22). By implementing ACMs, the proposed GWD Project would minimize impacts to big game species, but could not completely avoid contributing to incremental habitat fragmentation effects to these species in combination with other actions.

Groundwater pumping would be expected to change the distribution and movements of big game. As pumping would alter the availability of water and associated foraging habitat on the landscape, big game would make use of these high value habitats where they are found. Valleys where Proposed Action cumulative effects to at least one of the groundwater dependent habitats are likely to occur are listed above.

Other Terrestrial Species of Management Concern: The cumulative impact study area for other Terrestrial Species of Management Concern is the GWD Project ROW cumulative impact study area (**Appendix F**, **Figure F3.6-8**). The study area considers all the basins that are crossed by the GWD Project facilities. Most small mammals and reptiles have relatively small home ranges and are not long distance migrants. As with big game, cumulative impacts associated with the construction of roads and other infrastructure temporarily disturb habitat, potentially create barriers to movement, increase potential for vehicle collisions, and also convert habitat and contribute to fragmentation and associated effects as discussed previously. Future groundwater facilities development along with proposed wind, and power line projects in valleys impacted by the proposed project have the potential to contribute cumulatively to local population effects on small mammals and reptiles.

For birds, cumulative impacts from various projects would increase direct and indirect habitat loss, increase vehicle presence, and result in some direct mortalities to raptors and other birds from power lines and wind projects. Given the location of other RFFAs within basins where sagebrush habitat is the majority of the vegetation cover, (e.g., Spring Valley), impacts to sagebrush obligate birds would lead to additional long-term loss of habitat and further indirect impacts through displacement and habitat fragmentation.

By implementing ACMs, the proposed GWD Project would minimize impacts to management concern species but could not completely avoid contributing to incremental habitat fragmentation effects to these species in combination with other actions.

The potential reduced availability of spring, perennial streams, and ET wetland/meadow and basin shrubland habitats due to cumulative groundwater pumping, could result in reductions or even loss of local populations of less mobile species in specific areas and displacement of mobile species like birds. For migratory birds, pumping impacts could decrease the amount of stopover habitat available on the landscape. Valleys where Proposed Action cumulative effects to at least one of the groundwater dependent habitats are likely to occur are listed above.

Special Status Species

Desert Tortoise and Gila Monster: The cumulative impact study area for desert tortoise includes the valleys crossed by the proposed GWD Project facilities within desert tortoise range and also includes valleys that contain ACECs designated for desert tortoise protection (e.g. Kane Springs, Coyote Spring) crossed by the proposed GWD Project (**Appendix F**, **Figure F3.6-11**). The cumulative impact study area for gila monster includes the basins crossed by the proposed project facilities within gila monster habitat (based on the SWReGap animal habitat model) (see **Appendix F**, **Figure F3.6-12**).

PPAs including roads, utility corridors, human development, and wildfires have impacted large portions of these species' habitats. The major additive cumulative effects within these species' cumulative impact study areas would be the expansion in the width of adjacent utility ROWs and new transmission ROWs as well as the Coyote Springs Residential Development, which would convert and fragment habitat for desert tortoise, gila monster and other Mojave desert species habitat. Qualitatively, this would contribute to further fragmentation effects including isolating of populations, increasing potential for predation given additional above ground structures for perching and nesting of raptors and corvids, and increasing human-related disturbances (e.g., illegal collection, increased OHV use). By implementing ACMs, the proposed GWD Project would minimize direct take of desert tortoise and gila monsters and minimize impacts to habitat for these species once reclamation is complete. It would not completely avoid contributing to incremental habitat fragmentation effects to these species in combination with other actions. The Coyote Springs residential development has an associated habitat conservation plan and 40-year incidental take permit for desert tortoise. The habitat conservation plan also covers the banded gila monster and burrowing owl should they become listed in the future.

The Proposed Action pumping could contribute cumulatively to potential groundwater dependent habitat impacts within the range of the gila monster (stream miles in Lower Meadow Valley Wash at the 75 and 200 years plus full build out time frames). Desert tortoise is not dependent on groundwater dependent habitats.

Southwestern Willow Flycatcher, Yellow-billed Cuckoo, and Yuma Clapper Rail: These bird species would not be directly impacted by the proposed GWD Project facilities, so cumulative effects from surface impacts are not expected. For these species, the study area is water resources region of study. The southwestern willow flycatcher and yellow-billed cuckoo potentially could experience additional habitat impacts (forage and breeding), above those in the Cumulative No Action Alternative, under the cumulative Proposed Action pumping scenario by the full build out plus 200 years time frame or before. See **Table 3.6-25** for a summary of impacted habitat areas for these species by alternative. Note that groundwater dependent habitats in Las Vegas and streams in Muddy River Springs Area are impacted by the No Action Cumulative scenarios, but based on available data do not appear to interact cumulatively with the Proposed Action or other action alternatives. Lower Moapa valley model results show potential flow reductions at Overton which could potentially impact habitat for southwestern willow flycatcher and yellow-billed cuckoo. There are no recent records of occurrences for Yuma clapper rail in areas potentially impacted by drawdown.

Table 3.6-25 Potential for Cumulative Pumping Impacts to Springs or Perennial Streams in Valleys with Known Habitat for Southwestern Willow Flycatcher and Yellow-billed Cuckoo

	No Action	Proposed Action	A	B	C	D	E	F
Pahranagat (YBC, SWWF)	X	Y	X	Y	Y	X	X	X
Lower Meadow Valley Wash (YBC, habitat SWWF)	X	Y	Y	Y	Y	X	Y	Y
Muddy River Springs (YBC)	X	Y	X	Y	X	X	X	Y

N = no springs or perennial streams potentially impaeted in the valley; X = no additional incremental effect on habitat and species from this alternative; Y = inereases in impaets to springs or perennial streams above cumulative No Action pumping seenario.

SWWF = Southwestern Willow Flyeateher.

YBC = Yellow-billed Cuekoo.

Greater Sage-Grouse: The cumulative impact study area for greater sage-grouse was developed to include the NDOW population management units crossed by the GWD Project. Contiguous sage-grouse habitat areas across the Utah border were also included (**Appendix F**, **Figure F3.6-10**). While the GWD Project impacts less than 1 percent of the total habitat within the cumulative study area, when considered in context with the PPAs and RFFAs in the greater sage-grouse cumulative impact study area a large amount of sage-grouse habitat would be impacted because this species is a sagebrush obligate species sensitive to fragmentation effects. The major additive cumulative effects within these species' cumulative impact study areas would be the additional utility ROWs and wind power projects in Spring and Lake valleys. The increase in aboveground facilities including wind turbines and power lines would result in effects as described earlier in the section in ROW Areas and Groundwater Development Areas sections for this species. Cumulative effects within valleys could result in the reduction or loss of local populations. By implementing ACMs, the GWD Project would minimize impacts to habitat for greater sage-grouse species, but could not completely avoid contributing to incremental habitat fragmentation effects to this species in combination with other actions.

Proposed Action pumping would contribute incrementally to impacts to springs, perennial streams, and ET wetland/meadow and basin shrubland habitats, all important to greater sage-grouse. In valleys like Spring [184], Snake, Cave, and Hamlin, the Proposed Action would contribute all the impacts to at least one of the groundwater dependent habitats within the three model time frames, see **Table F3.6-17, Appendix F**. Cumulative pumping effects within valleys could result in the reduction or loss of local populations. Valleys where this species occurs that would have incremental contributions to groundwater dependent habitats from Proposed Action pumping include: Spring [184], Snake, Hamlin, Lake, Cave, Steptoe, Spring [201], and Eagle.

Additional Special Status Bird Species including Raptors and Important Bird Areas: For birds, cumulative impacts from various projects would increase direct and indirect habitat loss, increase vehicle presence, and could result in some direct mortalities to raptors and other birds from power lines and wind projects. Given the location of other RFFAs within basins where sagebrush habitat is the majority of the vegetation cover, (e.g., Spring Valley), impacts to sagebrush obligate birds would lead to additional long-term loss of habitat and further indirect impacts through displacement and habitat fragmentation. These cumulative surface impacts could result in reductions in local populations in specific areas. By implementing ACMs, the proposed GWD Project would minimize impacts to special status bird species but could not completely avoid contributing to incremental habitat fragmentation effects to these species in combination with other actions.

Proposed Action pumping would contribute incrementally to impacts to reduced availability of spring, perennial streams, and ET wetland/meadow and basin shrubland habitats which also could result in reductions or even loss of local populations in specific areas for bird species dependent on these habitat types. For special status migratory birds, pumping impacts could decrease the amount of stopover habitat available on the landscape. The location and risk to springs and perennial streams in relation to cumulative drawdown at the various model time frames are displayed in **Appendix F3.3.8**, **Figures F3.3.8B-1** through **F3.3.8B-3.** Refer to **Table F3.6-19, Appendix F** for data on the percent of groundwater dependent habitats potentially impacted by the cumulative pumping scenarios within valleys potentially impacted by Proposed Action cumulative pumping; and Section 3.4, Vegetation Resources, discusses the impacts to ET vegetation types from cumulative pumping and includes figures that include wetland meadow and basin shrubland information for cumulative with No Action, Proposed Action, and cumulative pumping with the Proposed Action as a way of identifying the incremental effects of the alternative

Cumulative pumping also could potentially impact springs and perennial streams in important bird areas. **Table F3.6-17, Appendix F** includes a list and number of important bird areas with either springs or perennial streams in areas potentially impacted by drawdown in the various model time frames. Because the No Action cumulative pumping scenario impacts Lower Meadow Valley Wash and the Pahranagat Valley Complex important bird areas at the full build out time frame, the Proposed Action also shows impacts to these two areas. The Proposed Action pumping increases the length of perennial stream miles in areas where impacts to flows could occur in the Lower Meadow Valley Wash important bird area during the full build out plus 75 years time frame. The Proposed Action has additional miles in areas potentially impacted by drawdown (approximately 24 miles) in the full build out plus 200 years time frame. The stream miles in Pahranagat Valley Complex remain the same when the No Action and Proposed Action are compared (approximately 0.5 mile) as do miles in the Muddy River Springs area (approximately 0.5 mile by the plus 200 years time frame). The other important bird areas impacted in later time frames include GBNP and D.E. Moore Bird and Wildlife Sanctuary. Perennial stream miles and springs within GBNP are also potentially impacted by Proposed Action cumulative pumping.

Pygmy Rabbit: The cumulative impact study area for pygmy rabbits was developed to include valleys crossed by the GWD Project within SWReGap modeled habitat (**Appendix F**, **Figure F3.6-9**). Habitat fragmentation is thought to limit pygmy rabbit dispersal capabilities given an apparent hesitancy to cross open habitats. Given their typical mode of escape (maneuvering into dense cover), pygmy rabbits are likely more vulnerable to predation in open habitats. RFFA projects within the pygmy rabbit cumulative impact study area would contribute to habitat loss and fragmentation effects to this species (e.g. Spring Valley). Overhead power lines also could contribute to potential predator perching sites, increasing predation potential on this species. By implementing ACMs, the proposed GWD Project would minimize impacts to pygmy rabbits; but could not completely avoid contributing to the long-term incremental sagebrush habitat fragmentation effects to this species in combination with other actions.

Valleys where this species occurs that would have incremental contributions to groundwater dependent habitats from Proposed Action pumping include: Spring [184], Snake, Hamlin, Lake, Cave, Steptoe, Spring [201], Panaca, and Eagle.

Bats: The cumulative impact study area for bat species is the project ROWs' cumulative impact study area (**Appendix F**, **Figure F3.6-8**). Types of projects that would most contribute to the additive cumulative effects to bat species would be the development of wind projects and utility corridors with overhead power lines as well as other projects that temporarily or permanently impact foraging habitat. Wind projects and projects that include overhead power lines would contribute to collision and electrocution potential of bat species, particularly if facilities are located within daily movement corridors (between roosting and foraging sites). By implementing the ACMs, the proposed GWD Project would minimize impacts to habitat for bat species, but could not completely avoid contributing to incremental foraging habitat and collision potential effects to these species in combination with other actions.

The most productive bat foraging habitat is the area around springs, perennial streams, and ET wetland/meadows as these areas typically support insects. Bats could be impacted by incremental Proposed Action cumulative drawdown in the valleys where any of these groundwater dependent habitats are impacted, refer to the groundwater pumping section above for the valleys likely impacted by Proposed Action cumulative pumping as well as **Table F3.6-1, Appendix F** for the species of bats that occur in those valleys.

Baking Powder Flat Blue Butterfly and White River Valley Skipper: The cumulative impacts study area for baking powder flat blue butterfly is the Baking Powder Flat ACEC as it contains all currently known records. As explained in the groundwater development – future facilities section, this species is found inside a proposed groundwater development area in Spring Valley. At this time, there are some water development projects within the ACEC. The Ely RMP designates this ACEC as an avoidance area and has it closed to locatable and leasable minerals, renewable energy, and does not allow any new roads (BLM 2008b). As described in the pumping effects section, the host plant for this species is an upland plant and not expected to be impacted by drawdown impacts. Cumulative impacts on this butterfly species from surface disturbance would be possible, but cumulative effects from pumping would be unlikely.

The cumulative impacts study area for White River valley skipper is White River, Lake and Spring valleys. White River valley skipper is not recorded within ROWs or groundwater development areas, so cumulative impacts from surface disturbance are not considered. This species, if present, may be impacted by drawdown in White River, Lake, and Spring valleys as explained in the pumping effects section. The apparent host plant for this species is wetland dependent. Both Lake and Spring valleys would have additional incremental effects on the groundwater dependent habitats from all the Proposed Action cumulative pumping as compared to the No Action alternative.

Other Wildlife Species of Interest

Cave Species: The cumulative impacts study area for cave species were the known caves within the ROW ACEC. Since proposed project facilities are unlikely to be located close to caves, cumulative effects from surface impacts are not expected.

As discussed in project specific pumping effects section, there are 6 caves in direct contact with the water table or surface water within susceptibility areas. They are all located in Snake Valley. If these caves have waters associated with them that are dependent on discharge from the regional groundwater flow system in Snake valley, habitat for cave obligate species may be impacted as a result of Proposed Action pumping which contributes almost all of the cumulative effects in this valley.

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3.6.3.7 Alternative A

Rights-of-way and Groundwater Development Area Construction and Maintenance

The effects of Alternative A surface disturbance resulting from ROWs and project facilities in combination with other cumulative actions on terrestrial wildlife resources would be the same as discussed for cumulative impacts with the Proposed Action. Maximum future groundwater development facility acreage would be less than under the Proposed Action, see **Table 3.6-26,** lowering the potential for cumulative effects with RFFAs.

Groundwater Pumping Effects

There are eight valleys that have at least one of the three groundwater dependent habitats incrementally impacted by Alternative A cumulative effects (i.e., have impacts beyond those attributable to the No Action cumulative effects) in at least one of the three model time frames; these include Spring [184], Snake, Hamlin, Steptoe, Lower Meadow Valley Wash, Cave, Spring [201], and Lake. **Table F3.6-20, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative A cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in these valleys. Figures in Section 3.5, Vegetation Resources, display the incremental contribution of the Alternative A cumulative to wetland/meadow and basin shrubland ET vegetation types as well as the number of springs and miles of perennial streams that are in areas potentially impacted by drawdown. Of these eight valleys, five (Spring, Snake, Cave, Steptoe, Hamlin) have all the potential incremental impacts of at least one groundwater dependent habitat coming entirely from the Proposed Action cumulative pumping. The other three valleys (Lake, Lower Meadow Valley Wash, and Spring [201]) show potential impacts based the No Action cumulative model results to which Alternative A cumulative contributes incrementally. The location and risk to springs and perennial streams in relation to cumulative drawdown at the various model time frames are displayed in **Appendix F**, **Figures F3.3.8B-04** through **F3.3.8B-06**.

Table 3.6-26 Summary of Surface Disturbance by Alternative

Alternative	Groundwater Development Future Facilities Construction Disturbance (Acres)	Percent Difference between Proposed Action and other Alternative Groundwater Development Future Facility Construction Disturbance[1]	Maximum Total Project Construction Disturbance (Acres)	Percent Difference between Proposed Action Total Project Acres and other Alternatives	Number of Groundwater Development Basins within which the Alternative would construct Future Facilities
Proposed Action	3,590-8,410	NA	20,713	NA	5
Alternatives A and C	2,069-4,814	43	17,117	17	5
Alternative B	4,664	45	16,967	18	5
Alternative D	2,513-4,005	52	12,848	38	4
Alternative E	1,754-4,079	51	14,775	29	4
Alternative F	2,698-6,629	24	17,325	17	4

[1] Based on maximum acres.

3.6.3.8 Alternative B

Rights-of-way and Groundwater Development Area Construction and Maintenance

The effects of Alternative B surface disturbance resulting from ROWs and project facilities in combination with other cumulative actions on terrestrial wildlife resources would be the similar to impacts discussed for cumulative impacts with the Proposed Action. Maximum future groundwater development facility acreage would be less than under the Proposed Action, see **Table 3.6-18,** lowering the potential for cumulative effects with RFFAs.

Groundwater Pumping Effects

There are 12 valleys that have at least one of the three groundwater dependent habitats incrementally impacted by Alternative B cumulative effects (i.e., have impacts beyond those attributable to the No Action cumulative effects) in at least one of the three model time frames; these include Spring [184], Snake, Hamlin, Steptoe, Lower Meadow Valley

Wash, Cave, Spring [201], Lake, White River, Panaca, Pahranagat, and Lower Moapa,. **Table F3.6-21, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative B cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in these valleys. Figures in Section 3.5, Vegetation Resources, display the incremental contribution of Alternative B cumulative to wetland/meadow and basin shrubland ET vegetation types as well as the number of springs and miles of perennial streams that are in areas potentially impacted by drawdown. Of these 12 valleys, 7 (Spring, Snake, Cave, Steptoe, Hamlin, Pahranagat, and Lower Meadow Valley Wash) have all the potential incremental impacts of at least one groundwater dependent habitat coming entirely from Alternative B cumulative pumping. The other five valleys (Panaca, Lake, Spring [201], Lower Moapa, and White River) show potential impacts based the No Action cumulative model results to which Alternative B cumulative contributes incrementally. The location and risk to springs and perennial streams in relation to cumulative drawdown at the various model time frames are displayed in **Appendix F3.3.8**, **Figures F3.3.8B-07** through **F3.3.8B-09**.

3.6.3.9 Alternative C

Rights-of-way and Groundwater Development Area Construction and Maintenance

The effects of Alternative C surface disturbance resulting from ROWs and project facilities in combination with other cumulative actions on terrestrial wildlife resources would be the same as discussed for cumulative impacts with the Proposed Action. Maximum future groundwater development facility acreage would be less than under the Proposed Action, see **Table 3.6-18,** lowering the potential for cumulative effects with RFFAs.

Groundwater Pumping Effects

There are seven valleys that have at least one of the three groundwater dependent habitats incrementally impacted by Alternative C cumulative effects (have impacts beyond those attributable to the No Action cumulative effects) in at least one of the three model time frames; these include Spring, Snake, Hamlin, Steptoe, Lower Meadow Valley Wash, Lake, and Cave. **Table F3.6-22, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative C cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in these valleys. Figures in Section 3.5, Vegetation Resources, display the incremental contribution of Alternative C cumulative to wetland/meadow and basin shrubland ET vegetation types as well as the number of springs and miles of perennial streams that are in areas potentially impacted by drawdown. Of these seven valleys, five (Spring, Snake, Cave, Steptoe, Hamlin) have all the potential incremental impacts of at least one groundwater dependent habitat coming entirely from Alternative C cumulative pumping. The other two valleys (Lake and Lower Meadow Valley Wash) show potential impacts based the No Action cumulative model results to which Alternative C cumulative contributes incrementally. The location and risk to springs and perennial streams in relation to cumulative drawdown at the various model time frames are displayed in **Appendix F3.3.8**, **Figures F3.3.8B-10** through **F3.3.8B-12**.

3.6.3.10 Alternative D

Rights-of-way and Groundwater Development Area Construction and Maintenance

Construction and facility maintenance in Snake Valley and White Pine County would be eliminated under Alternative D. As a result, construction of the remaining ROWs and project facilities in Lincoln and Clark County and the Lincoln County portion of Spring Valley would result in effects to terrestrial wildlife species and their habitats. This alternative would not interact with the Spring Valley Wind RFFA as that project occurs north of the county line in Spring Valley (**Figure 2.9-1**, Chapter 2). There would be no potential for cumulative impacts from surface impacts for Baking Powder Flat Blue butterfly as this species occurs north of the county line. Maximum future groundwater development facility acreage would be less than under the Proposed Action, see **Table 3.6-18,** lowering the potential for cumulative effects with RFFAs.

Groundwater Pumping Effects

There are seven valleys that have at least one of the three groundwater dependent habitats incrementally impacted by Alternative D cumulative effects (i.e., have impacts beyond those attributable to the No Action cumulative effects) in at least one of the three model time frames; these include Spring, Snake, Hamlin, Steptoe, Cave, Spring [201], and Lake. **Table F3.6-23, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative D cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in these valleys. Figures in Section 3.5, Vegetation

Resources, display the incremental contribution of Alternative D cumulative to wetland/meadow and basin shrubland ET vegetation types as well as the number of springs and miles of perennial streams that are in areas potentially impacted by drawdown. Of these seven valleys, six (Spring, Snake, Cave, Steptoe, Hamlin, and Spring [201]) have all the potential incremental impacts of at least one groundwater dependent habitat coming entirely from Alternative D cumulative pumping. The other valley (Lake) shows potential impacts based the No Action cumulative model results to which Alternative D cumulative contributes incrementally. The location and risk to springs and perennial streams in relation to cumulative drawdown at the various model time frames are displayed in **Appendix F3.3.8**, **Figures F3.3.8B-13** through **F3.3.8B-15**.

3.6.3.11 Alternative E

Rights-of-way and Groundwater Development Area Construction and Maintenance

Under Alternative E, surface disturbance impacts would exclude Snake Valley. With this exception, the effects of Alternative E surface disturbance resulting from ROWs and project facilities in combination with other cumulative actions on terrestrial wildlife resources would be the same as discussed for cumulative impacts with the Proposed Action. Maximum future groundwater development facility acreage would be less than under the Proposed Action, see **Table 3.6-18,** lowering the potential for cumulative effects with RFFAs.

Groundwater Pumping Effects

There are nine valleys that have at least one of the three groundwater dependent habitats incrementally impacted by Alternative E cumulative effects (i.e., have impacts beyond those attributable to the No Action cumulative effects) in at least one of the three model time frames; these include Spring, Snake, Hamlin, Steptoe, Lake, Lower Meadow Valley Wash, Cave, Spring [201], and White River. **Table F3.6-24, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative E cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in these valleys. Figures in Section 3.5, Vegetation Resources, display the incremental contribution of Alternative E cumulative to wetland/meadow and basin shrubland ET vegetation types as well as the number of springs and miles of perennial streams that are in areas potentially impacted by drawdown. Of these nine valleys, five (Spring, Snake, Cave, Steptoe, Hamlin) have all the potential incremental impacts of at least one groundwater dependent habitat coming entirely from Alternative E cumulative pumping. The other four valleys (Lake, Lower Meadow Valley Wash, White River and Spring [201]) show potential impacts based the No Action cumulative model results to which Alternative E cumulative contributes incrementally. The location and risk to springs and perennial streams in relation to cumulative drawdown at the various model time frames are displayed in **Appendix F3.3.8**, **Figures F3.3.8B-16** through **F3.3.8B-18**.

3.6.3.12 Alternative F

Rights-of-way and Groundwater Development Area Construction and Maintenance

Under Alternative F, surface disturbance impacts would exclude Snake Valley. With this exception, the effects of Alternative F surface disturbance resulting from ROWs and project facilities in combination with other cumulative actions on terrestrial wildlife resources would be the same as discussed for cumulative impacts with the Proposed Action. Maximum future groundwater development facility acreage would be less than under the Proposed Action, see **Table 3.6-18**, lowering the potential for cumulative effects with RFFAs.

Groundwater Pumping Effects

There are 12 valleys that have at least 1 of the 3 groundwater dependent habitats incrementally impacted by Alternative F cumulative effects (i.e., have impacts beyond those attributable to the No Action cumulative effects) in at least one of the 3 model time frames; these include Cave, Hamlin, Lake, Lower Meadow Valley Wash, Muddy River Springs Area, Panaca, Rose, Snake, Spring, Spring [201], Steptoe, and White River. **Table F3.6-25, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative F cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in these valleys. Figures in Section 3.5, Vegetation Resources, display the incremental contribution of Alternative F cumulative to wetland/meadow and basin shrubland ET vegetation types as well as the number of springs and miles of perennial streams that are in areas potentially impacted by drawdown. Of these 11 valleys, 6 (Spring, Snake, Cave, Steptoe, Hamlin, Rose) have all the potential incremental impacts of at least one groundwater dependent habitat coming entirely from Alternative F cumulative pumping. The other valleys (Lake, Lower Meadow Valley Wash, Panaca, Spring [201], and White River) show potential impacts based the No Action cumulative model results to which

Alternative F cumulative contributes incrementally. The location and risk to springs and perennial streams in relation to cumulative drawdown at the various model time frames are displayed in **Appendix F3.3.8**, **Figures F3.3.8B-19** through **F3.3.8B-21**.

3.7 Aquatic Biological Resources

3.7.1 Affected Environment

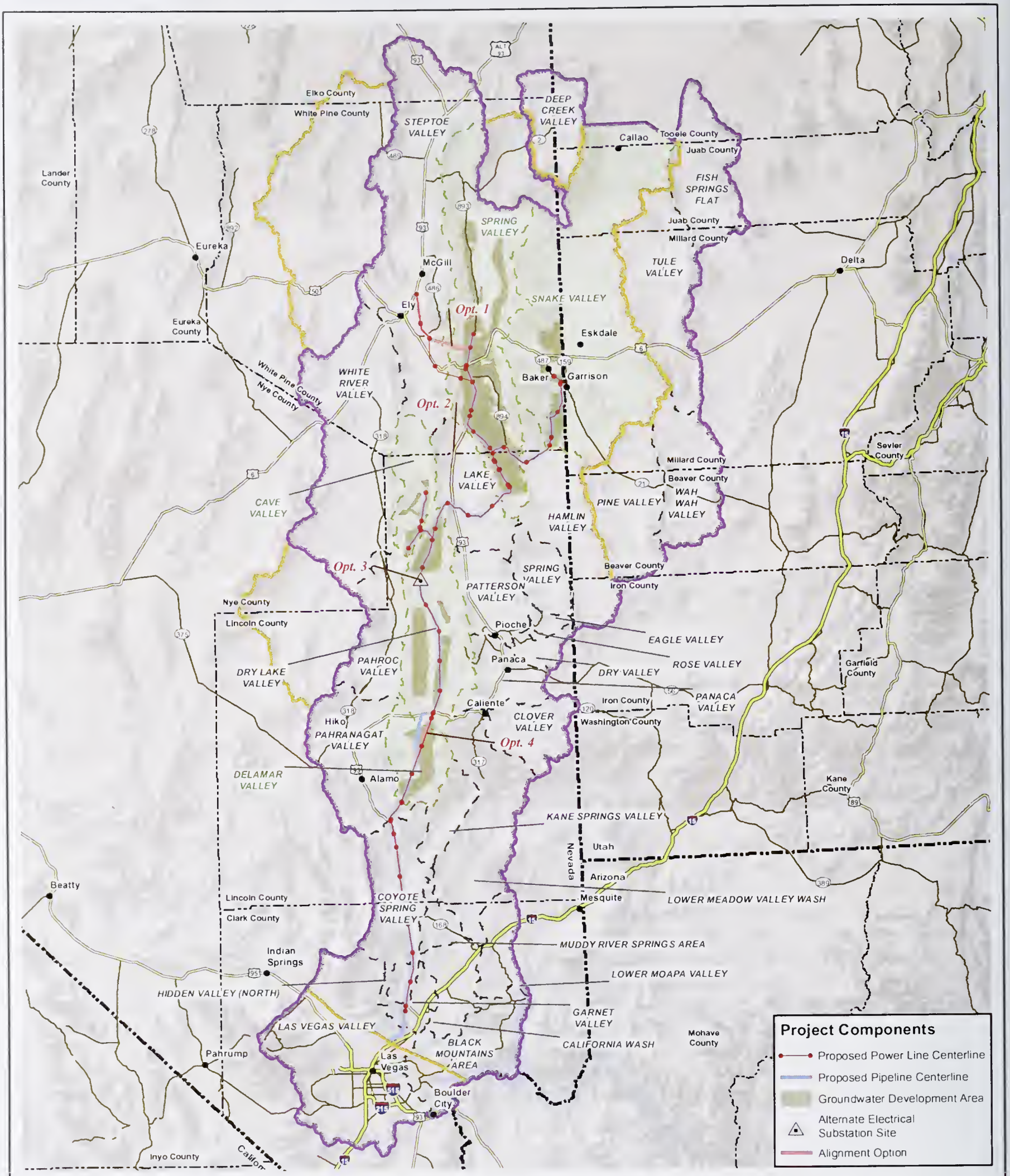
3.7.1.1 Overview

Aquatic biological resources within the study area include fish, invertebrates, amphibians, and their habitat. Species or groups that are emphasized in the baseline characterization are game fish species and special status fish, invertebrates, and amphibians. Other nongame native fish species also are included if they exhibit limited distribution or are considered in fish management actions. Information consists of game fish occurrence, macroinvertebrate composition, and special status species occurrence. An overview of aquatic resources within the study area is provided in this section. Detailed discussions of aquatic biological resources are included for specific portions of the study area in relation to ROW and groundwater development areas and the natural resources region of study as a broader geographical area (**Figure 3.7-1**). The natural resources region of study for aquatic biological resources includes 33 hydrologic basins that encompass portions of Nevada and Utah. The natural resources region of study is different than the water resources region of study in that seven basins (Butte, Tippett, Pleasant, Long, Jakes, Garden, and Coal) were excluded due to a lack of aquatic habitat for game fish and special status species. The natural resources region of study also included four basins (Pine, Wah Wah, Tule, and Deep Creek) that were not part of the model analysis area. The decision to include these basins was made by the Natural Resources Group because they contained aquatic habitats and special status species.

QUICK REFERENCE

afy – Acre-feet per year
BMP – Best Management Practice
cfs – Cubic-feet per second
ESA – Endangered Species Act
GBNP – Great Basin National Park
MOA – Memorandum of Agreement
NDOW – Nevada Department of Wildlife
NPDES – National Pollutant Discharge Elimination System
NWR – National Wildlife Refuge
POD – Plan of Development
RMP – Resource Management Plan
UDWR – Utah Division of Wildlife Resources
WMA – Wildlife Management Area

The study area is mainly in two ecoregions: the Mojave Desert and the Great Basin Desert. Both of these ecoregions are arid environments that receive relatively little precipitation, so aquatic environments generally are limited in number and often are isolated from one another. Aquatic habitat consisting of intermittent and ephemeral washes is common throughout the project study area, but this type of habitat is limited due to the lack of water on a consistent basis. Perennial springs and streams and reservoirs provide aquatic habitat throughout the year. Spring systems are scattered throughout the study area and represent the majority of the reliable water sources in the region (BIO-WEST 2007). As a result, the springs provide habitat for a variety of fish, invertebrate, and amphibian species. Permanent waterbodies in the form of perennial streams and lakes/reservoirs also are present in portions of the study area; the greatest number occur in the northern basins such as Snake, Spring (#184), Steptoe, Deep Creek, and White River. These habitats support the majority of the game fish populations within the study area.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

The types of aquatic habitat within the ROW and groundwater development areas and the natural resources region of study were identified using USGS Hydrography Dataset (USGS 2008). Descriptions of these three levels of the project study area are provided in Chapter 3, Affected Environment and Environmental Consequences, Introduction. Habitat was defined in terms of perennial streams and lakes, springs, reservoirs, and ponds. Spring habitat also included map files that were produced by Sada (2007a) and BIO-WEST (2009, 2007).

Perennial – Waterbody with water present continuously during a normal year.

Intermittent – Waterbody that flows or exists sporadically or periodically.

Ephemeral – Waterbody with water presence that is short-lived or transitory.

A variety of data sources were used to identify occurrences for aquatic species. Information on game fish occurrences was obtained mainly from the NDOW and the UDWR. Occurrence information for special status aquatic species was based on the Nevada and Utah Natural Heritage databases, the NDOW, and the UDWR. Additional surveys also were conducted in the natural resources region of study by BIO-WEST (2009, 2007), which identified the occurrence of fish, amphibians, and invertebrates in spring habitats. Additional data on springsnail occurrences in the natural resources region of study were provided by Hershler (1998) and Sada (2007a,b). Sources of occurrence information for amphibians (especially northern leopard frog) include BIO-WEST (2009, 2007), SNWA (2009a, 2008), Freeman (2012), a geodatabase created by the SNWA (2007a) from Hitchcock (2001), and the Nevada and Utah Natural Heritage databases. Information on aquatic communities in the GBNP was provided by GBNP (2007), Baker (2009), and unpublished spring data. Numerous other published literature sources, such as recovery plans, conservation plans, and journal articles, were used for sensitive aquatic species occurrences. These references are cited in discussions for various species. As previously mentioned in the overview for vegetation and wildlife resources (Sections 3.5, Vegetation Resources and 3.6, Terrestrial Wildlife), the Natural Resources Group also provided input and evaluation on species occurrences (ENSR/AECOM 2008).

In Nevada and Utah public waters, fish species are managed by the state agencies (NDOW and the UDWR, respectively) with coordination and cooperation with federal agencies (BLM, NPS, USFS, and USFWS). One exception to species management is the NPS authority in parks such as Great Basin (GBNP). The NPS direction is to protect and manage resources in the park including fish and wildlife resources. Fishing regulations in the GBNP are under the jurisdiction of U.S. and State of Nevada laws. Aquatic habitat is managed by the agency who owns or manages the land (i.e., BLM, NPS, USFS Humboldt-Toiyabe National Forest, and USFWS refuges). On lands with federally listed species, such species are under the jurisdiction of the USFWS. The USFWS coordinates with the state agencies to develop and implement recovery and other plans for threatened and endangered species. Collectively, the state and federal agencies develop and implement management plans and strategies for both game and nongame fish species and determine management practices that involve fishing regulations and habitat protection. Management direction and guidance are provided through the implementation of management plans, agreements, and their wildlife plans (e.g., Wildlife Action Plan [2006] and the Utah Comprehensive Wildlife Conservation Strategy [Sutter et al. 2005]).

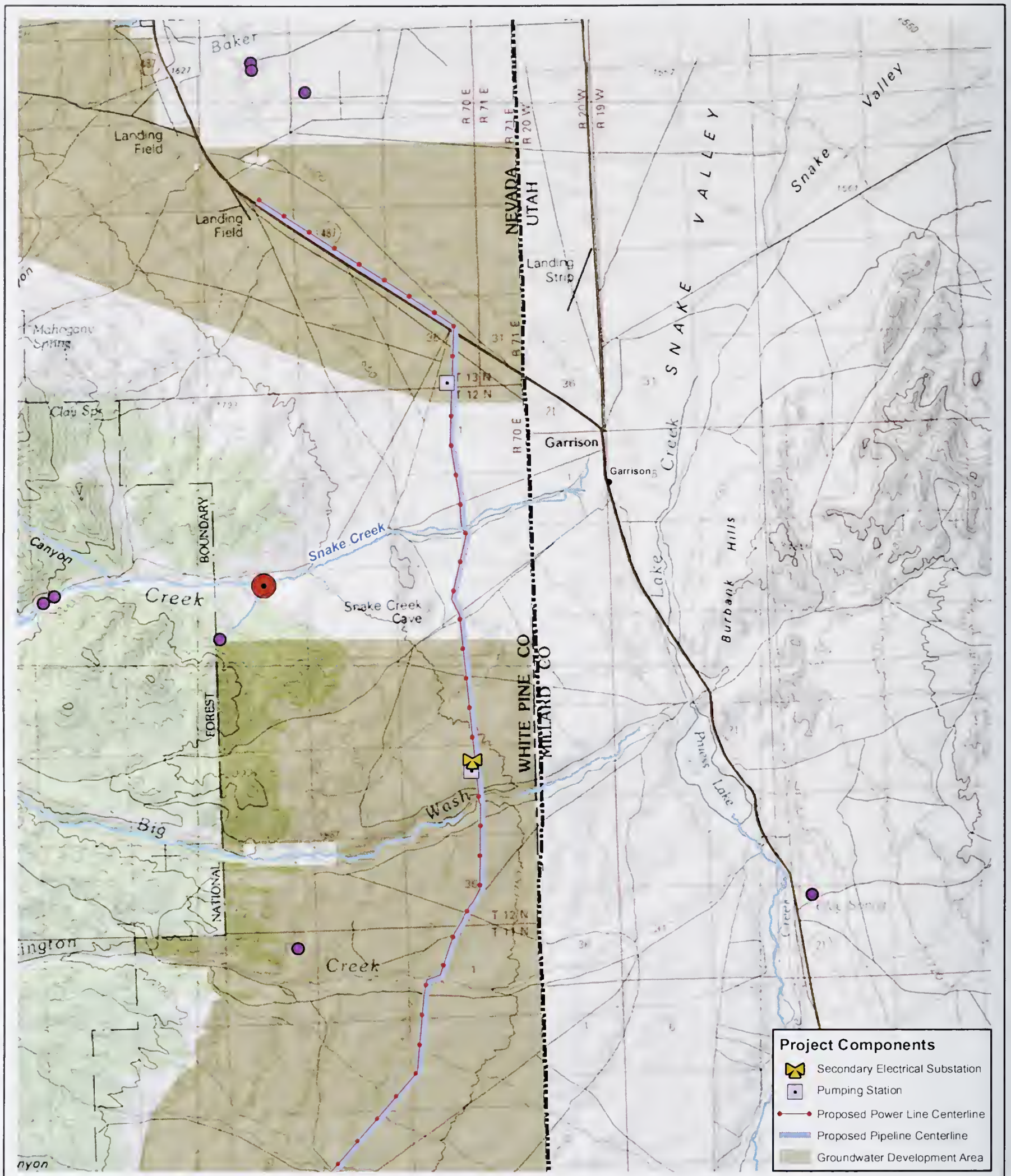
The discussions of special status aquatic species in the ROW, groundwater development areas, and the natural resources region of study include fish, amphibians, and invertebrates that are listed or proposed for listing under the ESA, and/or considered sensitive by the BLM or the USFS. Additional discussion on how the USFWS, BLM, and USFS define and manage these special status species is provided in Section 3.6, Terrestrial Wildlife. For this project, both the BLM and USACE must complete section 7 consultation under the ESA. The USACE has designated the BLM as the lead federal agency to act on their behalf for purposes of this consultation.

3.7.1.2 Right-of-way Areas

Habitats and General Aquatic Species

Streams

The pipeline ROWs would cross one perennial stream in the Snake Valley basin in Nevada (**Figure 3.7-2**). The pipeline ROWs also would cross intermittent streams (Lexington, Chokecherry, and Big Wash) and numerous ephemeral washes, such as Pahranagat. In addition, the power line ROWs would cross two perennial streams, Steptoe Creek in Steptoe Valley and Snake Creek in Snake Valley in Nevada. There are no ROWs in Utah. The Snake Creek crossing is the same for both the pipeline and power line ROW (**Figure 3.7-2**).



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Snake Creek supports a coldwater fishery with species including brook, brown, and rainbow trout. Brown trout occur throughout the stream on a year-round basis (Crookshanks 2010). Spawning and rearing habitat for brown trout exists in the area to be crossed by the pipeline ROW. Rainbow trout in this section of the stream are likely escapees from the NDOW Spring Creek Rearing Station, which is located approximately 2 miles upstream of the proposed pipeline crossing in Snake Creek. Brown and rainbow trout numbers in Snake Creek are maintained by natural reproduction. The NPS is considering stream eradication in 2012 to allow expansion of Bonneville cutthroat trout downstream to the hatchery, but the schedule has not been defined. The upper portion of the stream (upstream of the proposed pipeline and power line crossing) also contains Bonneville cutthroat trout. Rainbow trout and Bonneville cutthroat trout are spring spawners, while brook and brown trout spawn in the fall months. Snake Creek also supports native nongame species including mottled sculpin, speckled dace, and redside shiner that have been reintroduced in recent years.

One additional stream (Big Wash) to be crossed by the pipeline and power line is intermittent at the proposed crossing (**Figure 3.7-2**). No fish spawning or rearing habitat exists at this proposed crossing. The stream contains Bonneville cutthroat trout and three reintroduced native fish species (mottled sculpin, redside shiner, and speckled dace) in the perennial reach upstream of the proposed crossing (Crookshanks 2010). Some Bonneville cutthroat trout can be washed downstream during high flow periods (e.g., spring of 2005).

Steptoe Creek is the only additional perennial stream to be crossed by the power line ROW. This stream contains a coldwater game fishery consisting of brook, brown, and rainbow trout. The NDOW annually stocks rainbow trout in Steptoe Creek. Populations for the other two trout species are maintained by natural reproduction. The proposed crossing is considered spawning and rearing habitat for brown trout. Perennial streams also provide habitat for macroinvertebrate species. Macroinvertebrates serve important roles in the aquatic environment through their food-web dynamics and are indicators of water quality conditions (Barbour et al. 1999). Macroinvertebrate communities in Snake Creek were surveyed by the GBNP (2007) between 1997 and 2002. These sampling efforts revealed a total of 93 taxa, with trueflies (Diptera) representing the most abundant group by comprising approximately 29 percent of the total numbers. Beetles and mayflies were the next most abundant groups, which collectively comprised approximately 51 percent of the total numbers. Diversity indices and presence of mayflies, stoneflies, and caddisflies indicated nearly pristine water quality and habitat conditions. The mean abundance for 5 samples was 1,882 invertebrates per square meter, which is considered a moderate abundance value.

Springs

No springs are located within the pipeline or power line ROWs.

Special Status Aquatic Species

Waterbodies that would be crossed by the ROWs contain habitat for one special status fish species: Bonneville cutthroat trout. This species occurs in Big Wash and Snake Creek in White Pine County. As previously discussed, this species occurs in headwater areas located upstream of the proposed ROW crossings. No federally listed aquatic species or other special status species occur in waterbodies that would be crossed by the ROWs. The Bonneville cutthroat trout is a BLM Sensitive Species and USFS Sensitive Species and is managed under conservation agreements in Nevada and Utah (NDOW 2006; Lentsch et al. 2000). Cutthroat trout spawn in the spring and early summer months.

Based on a letter from the Confederated Tribes of the Goshute Reservation to the BLM (Steele 2010), streams crossed by the ROWs also contain "culturally significant plants and animals." In particular, Snake Creek is located within the aboriginal territory of the Confederated Tribes of the Goshute Reservation and supports "various species of fish that are culturally significant." In addition, the power line crossing of Steptoe Creek is located within the aboriginal territory of the Western Shoshone Tribe. This stream contains fish that may be culturally significant for this tribe. Fish in these streams include trout, minnow, and sculpin species.

Alignment Options 1 through 4

Aquatic habitat within three of the four Alignment Options (1, 3, and 4) is limited to intermittent streams or washes. No perennial streams are located within the ROWs of these alignment options. Aquatic communities in these intermittent streams consist of macroinvertebrates that have adapted to seasonal water availability. One perennial stream, Geyser Creek in Lake Valley, would be crossed by the pipeline and power line ROWs for Option 2 (North Lake Valley Pipeline Alignment). This stream contains rainbow and brook trout. Spring habitats are present near one of the alignment options: North Lake Valley Pipeline and Power Line Alignment (Option 2). Two special status aquatic

species, northern leopard frog and Lake Valley springsnail (pyrg), occur in the Wambolt Spring Complex, which is located approximately 0.1 mile from the ROW for the North Lake Valley alignment (Option 2).

3.7.1.3 Groundwater Development Areas

Aquatic habitat within the groundwater development areas includes numerous intermittent washes, perennial streams, several small playas, and springs. Ephemeral streams and springs are the most abundant type of surface water features. There are no perennial streams in Delamar Valley, Dry Lake Valley, and Cave Valley groundwater development areas. Perennial streams occur within the groundwater development areas in Spring and Snake valleys. The following information describes aquatic resources in these areas.

Habitats and General Aquatic Species

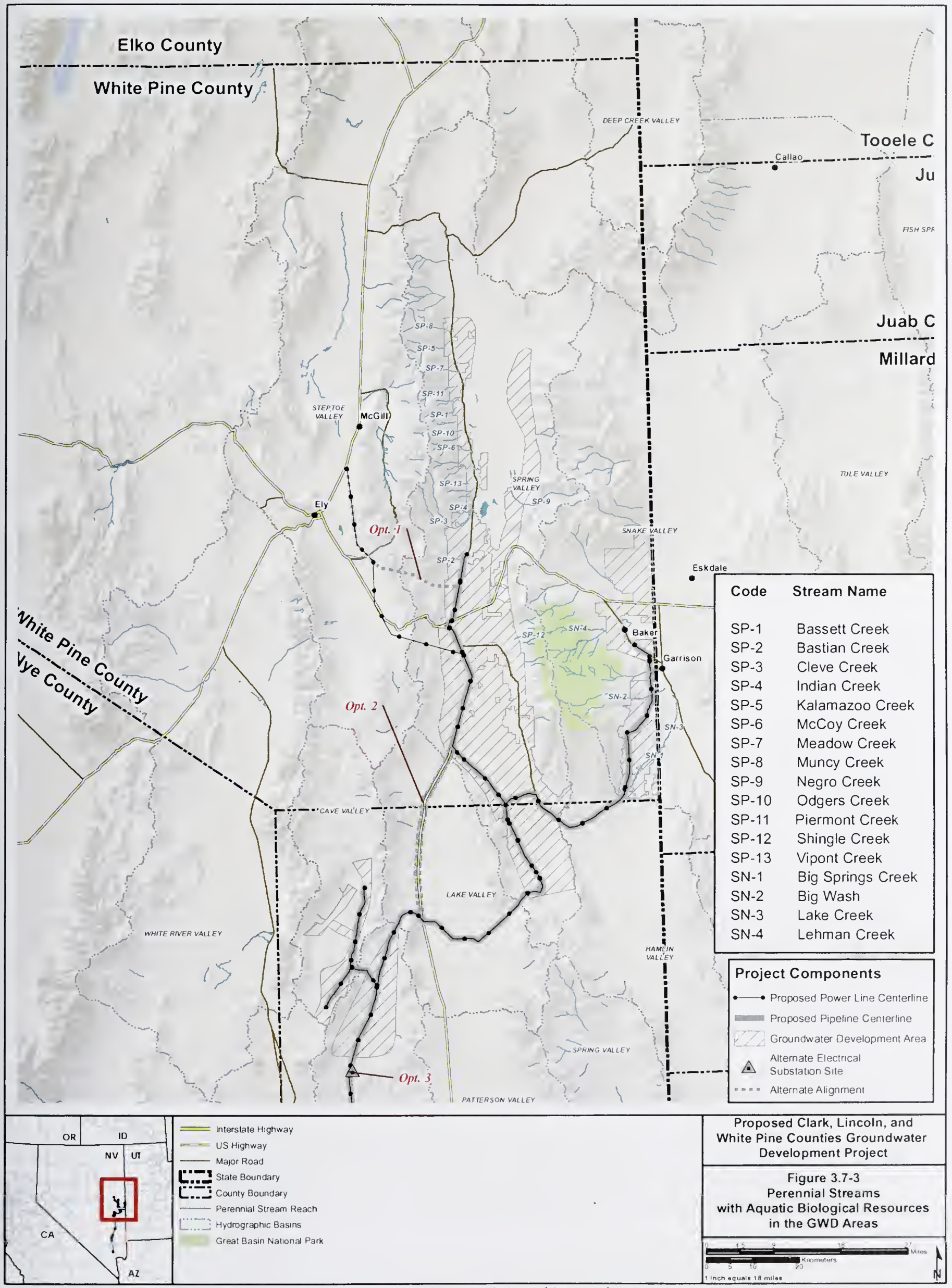
Streams

In total, the groundwater development areas in Spring and Snake valleys contain 13 and 4 perennial streams, respectively, that support coldwater game fish populations (**Table 3.7-1**) (**Figure 3.7-3**). The game species consist of four salmonid species (brook, Bonneville cutthroat, rainbow, and brown trout) and hybrids. In general, many of the stream reaches within the groundwater development areas have modified channels such as irrigation canals. The reaches support trout, but habitat quality has been reduced due to channel alterations.

Table 3.7-1 Perennial Streams[1] with Fish Species Occurrence Within the Groundwater Development Areas

Basin/Stream	Map Code (Figure 3.7-3)	Game Fish Species	Nongame Species
Spring Valley (Basin #184)			
Bassett Creek	SP-1	Rainbow trout	None
Bastian Creek and tributary	SP-2	Brown trout, rainbow trout	None
Cleve Creek and tributaries	SP-3	Brown trout, rainbow trout	None
Indian Creek	SP-4	Rainbow trout	None
Kalamazoo Creek	SP-5	Brown trout, rainbow trout	None
McCoy Creek	SP-6	Brown trout, rainbow trout, rainbow/cutthroat hybrid	None
Meadow Creek	SP-7	Brown trout	None
Muncy Creek	SP-8	Brook trout, brown trout, rainbow trout, rainbow/cutthroat hybrid	None
Negro Creek	SP-9	Brown trout, rainbow trout, trout hybrids	None
Odgers Creek	SP-10	Rainbow trout	None
Piermont Creek	SP-11	Brown trout	None
Shingle Creek	SP-12	Rainbow trout, rainbow/cutthroat hybrid	None
Vipont Creek	SP-13	Rainbow trout	None
Snake Valley			
Big Springs Creek	SN-1	None	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker
Big Wash	SN-2	Bonneville cutthroat trout	None
Lake Creek	SN-3	Sacramento perch	Mottled sculpin, redside shiner, speckled dace, Utah chub, Utah sucker
Lehman Creek	SN-4	Brook trout, brown trout, rainbow trout, rainbow/cutthroat hybrid	None

[1] Many of the stream reaches contain modified channels such as irrigation canals.



Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-3
Perennial Streams with Aquatic Biological Resources in the GWD Areas

No Warranty is made by the Bureau of Land Management as to the accuracy reliability, or completeness of these data for individual use or aggregate use with other data

In general, other native and nonnative fish species do not occur in most of the perennial streams in the groundwater development areas. However, there are exceptions in four Snake Valley streams. Big Springs Creek/Lake Creek in Snake Valley contain native species such as redside shiner, speckled dace, mottled sculpin, Utah sucker, and Utah chub (NDOW 2007). In addition, mottled sculpin, redside shiner, and speckled dace occur in Upper Snake and Strawberry creeks and the South Fork of Big Wash. Big Springs Creek is the only stream in Nevada that supports this assemblage of Bonneville basin species. As a result of their limited distribution in Nevada, the NDOW considers this fish community to be unique.

The perennial streams in the groundwater development areas also support macroinvertebrate communities. Based on surveys conducted in Lehman Creek in 1997 and 1998 by the GBNP (2007), the macroinvertebrate communities were considered diverse (total of 58 taxa) and moderately abundant (mean of 6,600 invertebrates per square meter). Taxonomic composition was dominated by mayflies, which comprised approximately 66 percent of the total numbers. Other abundant taxonomic groups that comprised at least 10 percent of the total numbers included chironomid midges and beetles. Diversity indices and presence of mayflies, stoneflies, and caddisflies indicated nearly pristine water quality and habitat conditions.

Springs

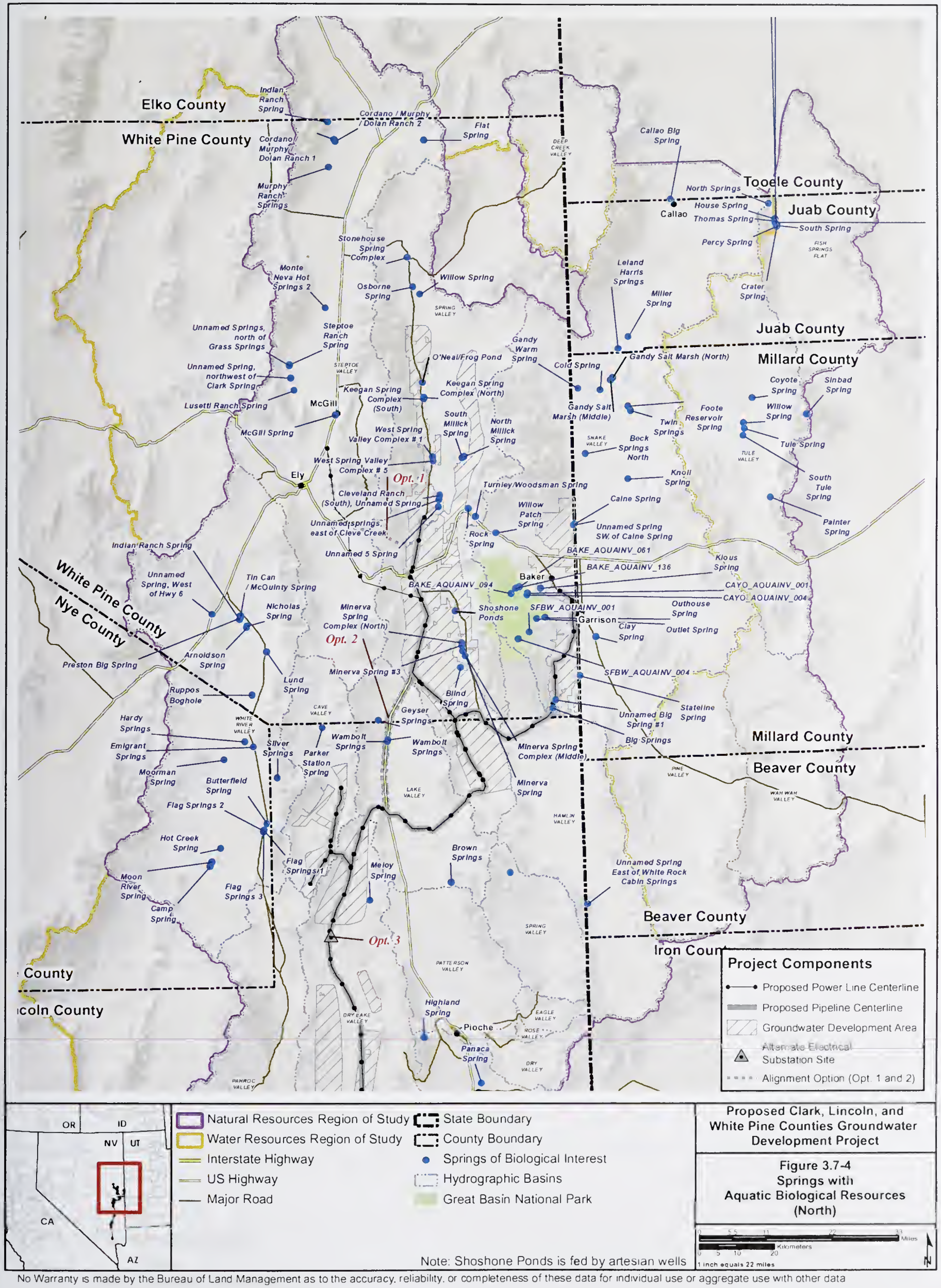
Springs with aquatic biological resources within and in the region of groundwater development areas are shown in **Figures 3.7-4** and **3.7-5**. Springs are located in all five basins associated with the groundwater development areas (**Figures 3.3.1-4** through **3.3.1-9**, in Section 3.3, Water Resources). The highest number of springs is within the Spring and Snake groundwater development areas (**Figures 3.3.1-4** and **3.3.1-5**). Previous aquatic biological surveys in springs within the groundwater development areas indicated that there was limited fish habitat (BIO-WEST 2007). No fish habitat was identified in the few springs located in the Cave and Dry Lake groundwater development areas due to shallow depths. Based on fish surveys conducted in springs within the Delamar, Snake, and Spring valley groundwater development areas, no fish are present (**Table 3.7-2**).

Nongame native fish species occur in Big Springs, which is located approximately 300 feet from the boundary of the Snake Valley groundwater development area. Species include mottled sculpin, redside shiner, Utah chub, Utah sucker, and speckled dace (BIO-WEST 2007; NDOW 2011a).

Based on surveys conducted in six of the springs in the Spring Valley groundwater development areas (Blind, Layton, North Milliek, South Millick, South Bastian, and unnamed east of Cleve Creek), these waterbodies support fairly diverse and abundant macroinvertebrate communities (BIO-WEST 2009, 2007). Chironomid midges, oligochaete worms, amphipod crustaceans, dragonfly larvae, and ostracod crustaceans were the most abundant taxonomic groups. Mollusks also were present in most springs. The total number of taxa ranged from approximately 6 to 40. Macroinvertebrate abundances ranged from approximately 2,000 to 17,000 organisms per composite D-frame sampler. Springsnails, such as the Toquerville pyrg, also were present in two springs, an unnamed spring south of Caine Spring in Snake Valley and an unnamed spring east of Cleve Spring in Spring Valley.

Two additional springs, West Spring Complex #1 in Spring Valley and Caine Spring in Snake Valley, are located just outside the groundwater development area boundaries. The approximate distances from the development area boundaries are 20 feet and 170 feet, respectively. No fish were collected in either of these springs during field surveys (BIO-WEST 2007). Macroinvertebrate communities in these two springs were moderately diverse and abundant (17 taxa and mean density of 12,480 invertebrates per sample in Caine Spring and 29 taxa and mean density of 5,574 invertebrates/sample in West Valley Complex #1) (BIO-WEST 2007). The most abundant taxonomic groups included amphipod crustaceans and ostracods. Springsnails (Toquerville pyrg) were present in both springs.

Of the springs located within the groundwater development areas (**Figures 3.7-4** and **3.7-5**), amphibians (i.e., northern leopard frog) were observed in three springs (Blind, North Milliek, and South Milliek) in Spring Valley (BIO-WEST 2009, 2007). Potential suitable habitat may exist for other amphibian species in springs with perennial flow, as well as ephemeral (seasonal) waterbodies within the groundwater development areas. Examples of springs with perennial flow include Four Wheel Drive, Layton, North Milliek, South Milliek, and South Bastian. Regarding the two springs located just outside of the groundwater development areas (Caine Spring in Snake Valley and West Valley Complex #1 in Spring Valley), the northern leopard frog was collected in the West Valley Complex #1 (BIO-WEST 2007).



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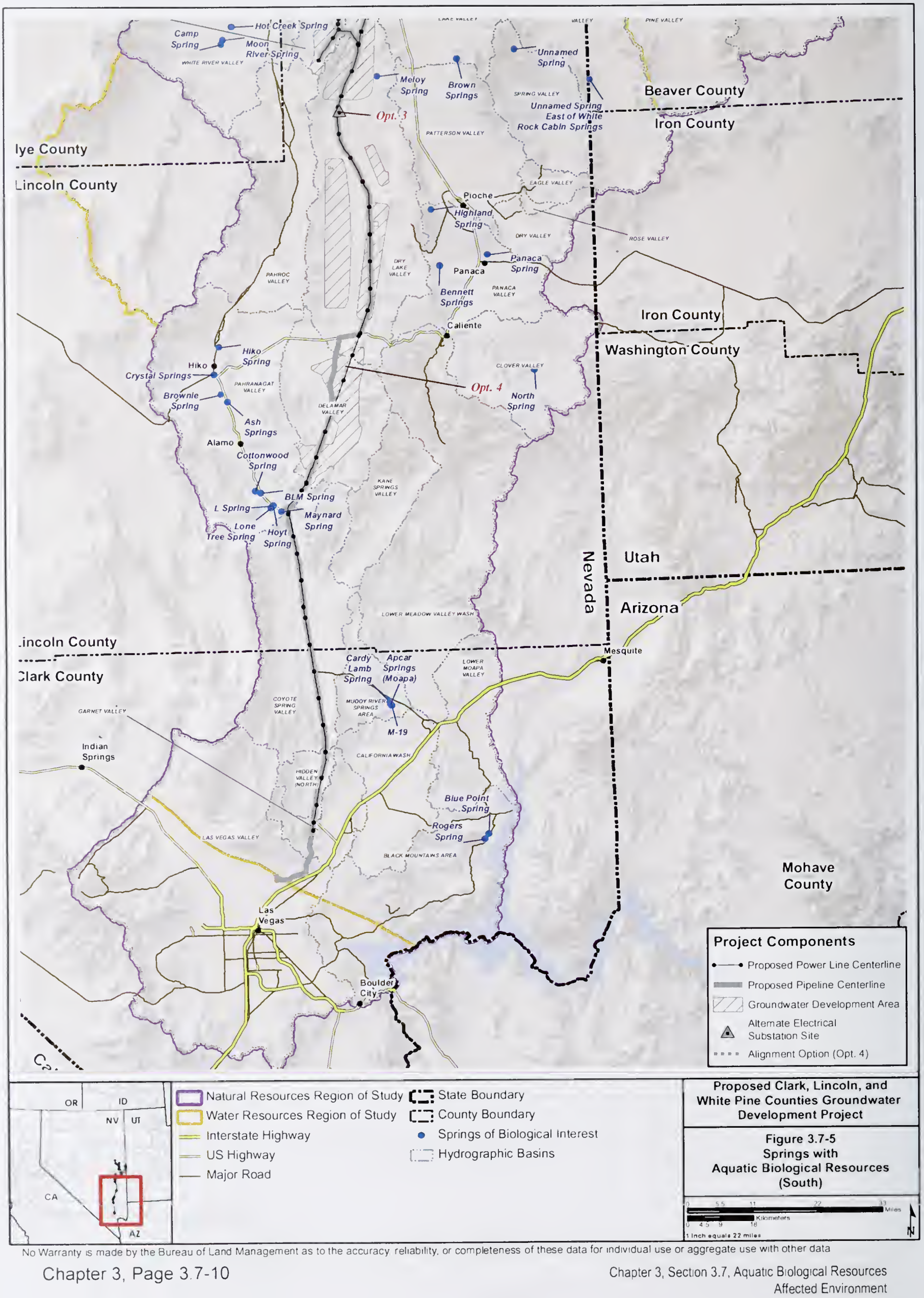


No Warranty is made by the Bureau of Land Management as to the accuracy reliability, or completeness of these data for individual use or aggregate use with other data

Table 3.7-2 Results of Biological Surveys Conducted in Springs Within or Adjacent to the Groundwater Development Areas

Basin/Spring	Fish Present?	Northern Leopard Frog Present?	Springsnails Present?
Delamar			
Grassy Spring	No	No	No
Snake			
North Little Spring[1]	No	No	No
Unnamed spring #2 north of Big Springs[1]	No	No	No
Unnamed spring south of Caine Spring	No	No	Yes
Spring			
Blind	No	Yes	No
Four Wheel Drive	No	No	No
Layton Spring	No	No	No
North Millick Spring	No	Yes	No
South Bastian Spring	No	No	No
South Millick Spring	No	Yes	No
The Seep	No	No	No
Unnamed spring east of Cleve Creek	No	No	Yes

[1]Springs are located adjacent to the groundwater development areas.

Sources: BIO-WEST 2009, 2007; SNWA 209, 2008.

Ephemeral Pools and Playas

A number of ephemeral pools and playas are located in the groundwater development areas. Since the majority of these habitats hold water only briefly (i.e., they are rainfall dependent), they typically contain fewer taxa. However, when they hold water, ephemeral pools support an abundance of aquatic invertebrates, which are an important food source for migratory birds (Wildlife Action Plan Team 2006). They also play a crucial role in maintaining populations of aquatic invertebrates, such as brine, fairy, and tadpole shrimp, in desert systems, as well as providing breeding habitat for amphibians such as the Great Basin spadefoot (Wildlife Action Plan Team 2006).

Special Status Aquatic Species

Based on a review of occurrence data (Baker 2008; BIO-WEST 2009, 2007; NNHP 2006; Hershler and Sada 2002; Sada 2007a,b; Sada and Vinyard 2002; UNHP 2005), the potential occurrence of special status aquatic species was identified for the groundwater development areas. Species occurrence, by basin area, is provided in **Appendix F**, **Table F3.7-1**. **Figures F3.6-1** and **F3.6-2** (**Appendix F**) show the occurrence of federally listed species in the study area. Scientific names of aquatic species also are provided in **Appendix F**, **Table F3.7-1**.

Streams

Within the five groundwater development areas, one stream (Big Wash in Snake Valley) contains Bonneville cutthroat trout, a BLM sensitive species. One perennial stream, Big Springs Creek in Snake Valley, contains native species such as redside shiner, speckled dace, mottled sculpin, Utah sucker, and Utah chub. Although these fish species have no special status designation, they are considered unique because of their limited occurrence in Nevada.

Springs

No special status fish species have been collected in springs within the groundwater development areas, based on surveys conducted by BIO-WEST (2009, 2007).

Three springs within the Spring Valley groundwater development area (Blind, North Millick, and South Millick) contain known populations or suitable habitat for the special status amphibian species, northern leopard frog

(**Figure 3.7-4**). The status of this species is discussed in Section 3.7.1.4, Region of Study, Amphibians. The springs provide habitat for breeding and early life-stage development. In addition, northern leopard frog is present in the West Valley Complex #1, which is located just outside of the groundwater development in Spring Valley.

One group of aquatic species (springsnails) has been documented in the groundwater development areas in two basins: Snake and Spring (BIO-WEST 2009, 2007). The petitioned springsnails (bifid duct and longitudinal gland prygs) have been collected in Big Springs and an unnamed spring north of Big Springs, which are located approximately 300 feet from the groundwater development boundary in Snake Valley.

Springsnails are considered a special status group of mollusks because of their restricted distribution and native origin. Many species of springsnails are endemic to one or two spring complexes and are considered BLM sensitive and species of concern in Utah and Nevada. Additional information on springsnails, including those petitioned for listing under the ESA, is provided in Section 3.7.1.4, Region of Study, Special Status Aquatic Species.

3.7.1.4 Region of Study

Habitats and General Aquatic Species

Streams

Fourteen game fish species, including trout hybrids, occur within the natural resources region of study, which represents a broader geographical area (**Appendix F**, **Table F3.7-2**). The species represent both coldwater (trout) and warmwater (bullhead, catfish, sunfishes, crappies, largemouth bass, and Sacramento perch) species. In total, 16 valleys or basins within the overall region of study contain one or more game fish populations. Steptoe, Spring, and Snake valleys contain the highest number of waterbodies with game fisheries. Stream and lake/reservoir habitats contain the most productive and diverse game fisheries. Trout species can utilize both stream and lake/reservoir habitats, but they require streams for spawning. Species that prefer ponds and lakes include white crappie, bullhead (black and brown), and largemouth bass. As previously mentioned, the trout species are spring (rainbow and cutthroat) and fall (brook and brown) spawners. The warmwater species spawn in late spring or summer. Habitat and spawning periods for all game fish species are provided in **Appendix F**, **Table F3.7-3**.

A mixture of Bonneville Basin native nongame fish inhabits Big Springs Creek in the Nevada portion of Snake Valley and Lake Creek in the Utah portion of Snake Valley. The Big Springs system is considered unique because it is one of only two waters in Nevada that contain this suite of Bonneville Basin species. A survey in 2005 documented the presence of Utah chub, speckled dace, redside shiner, mottled sculpin, and Utah sucker in various reaches between the spring source and the Nevada-Utah stateline (Tallerico and Crookshanks 2005).

Big Springs Creek in Nevada is renamed Lake Creek when it enters Utah. Lake Creek flows in a northeasterly direction and provides water to Pruess Lake. Surveys conducted in Lake Creek in 2008 by BIO-WEST (2009) collected mottled sculpin, redside shiner, speckled dace, Utah sucker, and Utah chub. The most abundant species included speckled dace and mottled sculpin, which collectively comprised 59 percent of the total catch. The percent composition for the other species was 28 percent for Utah chub, 11 percent for redside shiner, and 2 percent for Utah sucker. A population of the game fish species, Sacramento perch, also exists in Lake Creek.

Stream systems in Sunnyside Creek (White River Valley) and Meadow Valley Wash (Dry and Panaca valleys) also provide habitat for native fish species. Sunnyside Creek contains populations of White River spinedace, speckled dace, and desert suckers. The upper portion of Meadow Valley Wash in Panaca and Dry valleys supports populations of Big Springs spinedace (federally threatened), speckled dace, and desert suckers, while the lower portion of Meadow Valley Wash contains dace and sucker species. Two of these species, Big Springs spinedace and White River spinedace (federally endangered), are discussed separately in the Federally Listed Species section. These stream systems provide the most extensive habitats for speckled dace and desert sucker subspecies within the natural resources region of study.

Based on fish surveys conducted in the GBNP, game fish composition and abundance is available for Lehman, Baker, and Snake creeks (GBNP 2007). The number of game fish species in the surveyed reaches ranged from one to two species in Snake Creek (brown and brook trout) to three species in Lehman and Baker creeks (brook, brown, and rainbow trout). Trout abundance varied depending on the stream and location of the survey reach. When considering surveys conducted since 2000, the following ranges in abundances were reported for these streams: lower reaches of

Baker Creek (300 to 600 fish per mile), lower reaches of Lehman Creek (2,100 to 3,000 fish per mile), and Snake Creek (2,500 to 3,200 fish per mile).

Three streams within the GBNP, South Fork Big Wash, Strawberry, and Snake creeks, also contain native nongame fish species such as mottled sculpin, speckled dace, and redside shiner. Native fish species are considered species of management concern due to their native origin and limited distribution within the GBNP and the general region.

A key source of information for characterizing stream macroinvertebrate communities within the region of study is the GBNP (2007) stream surveys. Macroinvertebrate communities in Lehman and Snake creeks were previously discussed in the ROW and groundwater development sections. In addition, macroinvertebrate surveys were conducted in Baker Creek in 1997 and 1998. Mayflies were the most abundant major taxonomic group in Baker Creek. Based on these surveys, macroinvertebrate communities are considered moderately abundant and diverse, as indicated by a mean density of 4,123 invertebrates per square meter and a total of 68 taxa.

Macroinvertebrates also are present in six caves within the GBNP that contain flowing water. These include Model, Ice, Wheeler's Deep, and System's Key caves in the Baker Creek watershed; Squirrel Spring Cave in the Snake watershed; and the Water Trough Cave in the Can Young watershed (Baker 2009, 2007). Taxonomic groups that have been collected in surface water habitat include mollusks, mayflies, caddisflies, stoneflies, trueflies, springtails, copepods, ostracods, oligochaete worms, and flatworms. Unique cave-dwelling species in close contact with water were collected in Model Cave, where a Nevada state record earthworm (*Haplotaxis gordiodes*) was found along with possible new species of an ostracod and an amphipod (S. Taylor, personal communication, as cited in Baker 2009).

Springs

Spring habitats, which include wetlands and riparian areas, are scattered throughout Clark, Lincoln, Nye, and White Pine counties in Nevada and Beaver, Millard, Juab, and Tooele counties in Utah (**Figures 3.7-4** and **3.7-5**). In arid areas such as the Great Basin, springs provide a reliable source of water that represents important habitat for aquatic species. As a result of their consistency as water sources, spring systems are considered "biodiversity hotspots" that are critical to the survival and persistence of numerous plant and animal species (Sada and Vinyard 2002). In addition, the Great Basin's hydrologic history has resulted in many of these spring systems being fragmented and isolated from adjacent springs. This situation has contributed to the presence of unique and endemic aquatic species.

Springs and associated wetlands do not support diverse game fish populations. Springs are often small and shallow and do not typically support trout species or other large predatory fish. Smaller game fish, such as green sunfish and bluegill, are present in some spring habitats. The only known occurrences of trout species in spring habitats within the region of study were noted in Swallow Spring in Spring Valley and Rowland Spring and an unnamed spring near Strawberry Creek in Snake Valley, where rainbow or brook trout have been reported (BIO-WEST 2009; Dickinson 2010).

Within the region of study, information on fish occurrence in spring habitats is provided in reports by BIO-WEST (2009, 2007) and occurrence data in the Natural Resources Baseline Summary Report (ENSR/AECOM 2008). Fish communities are known to occur in springs within the following natural resources region of study basins: Fish Springs, Spring (#184), Snake, Steptoe, Muddy River Area, White River, Pahranagat, and Panaca (**Appendix F**, **Table F3.7-4**). White River Valley contains the largest number of springs with fish populations. In general, the number of species ranges from one to four. Native species in these springs are represented by Utah chub, least chub, relict dace, speckled dace and subspecies, mottled sculpin and subspecies, desert sucker subspecies, springfishes, and Pahrump poolfish. Many of the native fish species occurring in these springs are special status species, which are discussed in Special Status Aquatic Species. The occurrence of federally listed species in spring habitats (e.g., White River spinedace within the Flag Spring complex in White River Valley) is discussed in the Federally Listed Species section.

Nonnative fish species, such as western mosquitofish, guppy, shortfin molly, convict cichlid, and common carp, have been introduced into waters within the study area (BIO-WEST 2007). These nonnative species have caused population declines in numerous waterbodies that are inhabited by rare endemic species. Many native species, including northern leopard frog and White River springfish, are threatened by nonnative species (Wildlife Action Plan Team 2006).

Macroinvertebrate and springsnail surveys were conducted in springs within the following natural resources region of study basins by BIO-WEST (2009, 2007): Tule, Fish Springs, Snake, Pleasant, Spring (#184), Lake, White River, Dry Lake, Delamar, Pahranagat, and Panaca. Macroinvertebrate diversity varied in the springs from approximately 4 to 44 taxa. The most abundant taxa typically included amphipods, ostracods (seed shrimp), and chironomid midges. Other taxonomic groups that were present in most springs included damselfly larvae, mayfly, stonefly, caddisfly larvae, oligochaete worms, and beetles. Springsnail occurrence in these springs is discussed in Special Status Aquatic Species, Aquatic Invertebrates.

A variety of nonnative invertebrate species have become established in aquatic habitats within the study area. These include red swamp crayfish and red-rimmed melania snail. Crayfish adversely affect warmwater fauna by feeding on early life stages of fish and amphibians, and also on adult life stages of small-bodied fish (most of the federally listed fish in Nevada) (Wildlife Action Plan Team 2006).

Springs also provide habitat for amphibians. Springs are numerous and widely distributed throughout the study area, although they are more abundant north of Clark County, Nevada. They vary greatly in size and quality of habitat. Many have been damaged by livestock, had their water diverted for human use, or were otherwise altered. Introduced aquatic species are present at many springs and have impacted native amphibian populations. Toads use the moist and vegetated areas for feeding, breeding, and shelter. Frogs, including introduced bullfrogs, may be found in springs year-round and may overwinter under water in colder areas. The following species occur within the natural resources region of study area springs: Arizona toad, bullfrog, Great Basin spadefoot, red-spotted toad, Woodhouse's toad, Pacific chorus frog, northern leopard frog, relict leopard frog, and Columbia spotted frog (SNWA 2008; NatureServe 2007).

At least two nonnative amphibian species have been documented within the region of study: tiger salamanders and bullfrogs. These are considered to be exotic species in Nevada (BIO-WEST 2007; NatureServe 2007). Aside from springs, both species potentially occur in all aquatic habitat types within the study area (NatureServe 2007). As mentioned for crayfish, bullfrogs also prey on other amphibians and small-size fish. Bullfrogs inhabit permanent waterbodies throughout the year.

Shoshone Ponds

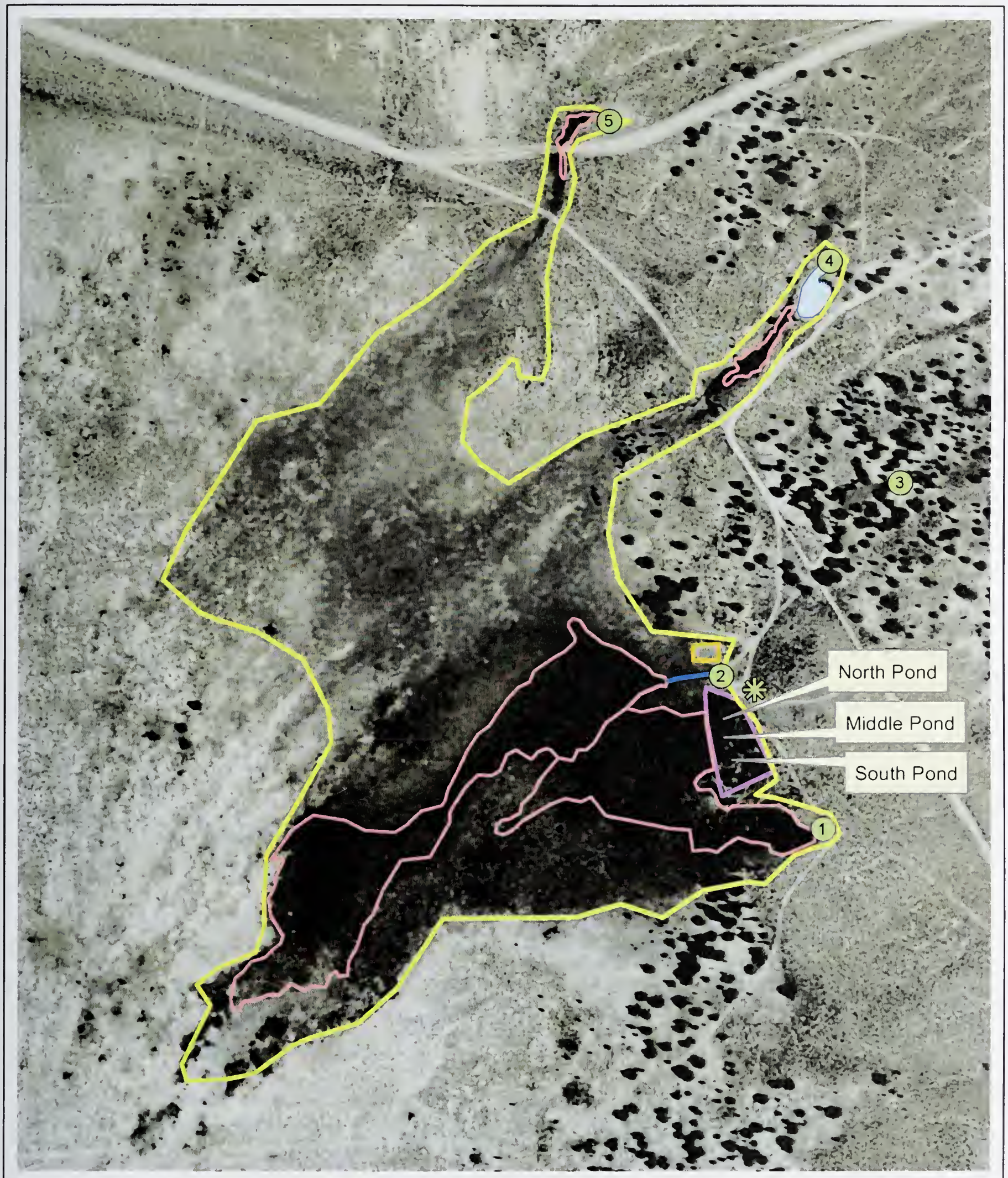
The natural resources region of study also includes a series of man-made ponds located in Spring Valley, White Pine County, Nevada, referred to as the Shoshone Ponds Native Fish Refugium. The refugium was established in the 1970s as a cooperative effort between the NDOW and the BLM Ely Field Office to help conserve and recover native fishes. Aquatic habitat consists of three small ponds that are fed by an artesian well within a fenced enclosure (**Figure 3.7-6**). A larger earthen pond (referred to as Stock Pond) is located outside of the enclosure and is maintained by a separate artesian well. Two refugium ponds (north and middle), the stock pond, and the springbrook created by well #2 outflow are inhabited by the federally listed Pahrump poolfish. Other special status species in the Shoshone Ponds area include relict dace (South Pond) and northern leopard frog.

Lakes/Reservoirs

Aquatic habitat also is provided by numerous lakes, reservoirs, and ponds within the natural resources region of study (**Appendix F**, **Table F3.7-5**). In total, one or more named lakes or reservoirs occur in the following basins: Deep Creek, Wah Wah, Pine, Spring (#201), Snake, Steptoe, Clover, Dry Lake, Patterson, Lake, Lower Moapa, White River, Pahranagat, and Las Vegas. The highest number of named lakes and reservoirs is located in the Snake and Steptoe hydrologic basins. Habitat for game fish occurs in Las Vegas, Pahranagat, White River, Lower Moapa, Spring (#201), Dry, Steptoe, Panaca, Rose, and Snake (**Appendix F**, **Tables F3.7-2** and **F3.7-5**). These waterbodies also provide occupied habitat for native and introduced fish species, invertebrates, and amphibians. The margins and nearshore areas of these waterbodies often provide feeding areas, cover, and breeding areas for fish and amphibians. Occurrence of other sensitive aquatic species in lakes or reservoirs includes Lahontan cutthroat trout in Baker Lake and California floater (freshwater mussel) in Pruess Lake. Further discussion of sensitive aquatic species is provided in the subsequent section.

Special Status Aquatic Species

The occurrence of special status aquatic species within the natural resources region of study is listed by basin in **Appendix F**, **Table F3.7-1**. The list includes over 50 species of fish, amphibian, and invertebrate species with federal, state, or BLM special status. The study area contains habitat for seven federally listed species. The occurrence of the



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

federally listed fish species within the natural resources region of study is shown in **Appendix F**, **Figures F3.6-1** and **F3.6-2**. Two of these species (White River springfish and Hiko White River springfish) occur in spring habitats. Pahrump poolfish inhabit the Shoshone Ponds area with habitats consisting of a man-made refugium that is fed by artesian wells, the stock pond, and a springbrook created by well #2 outflow. The other four species (Pahranagat roundtail chub, Big Springs spinedace, White River spinedace, and Moapa dace) use springs or stream habitats. Critical habitat has been designated for four of the fish species (White River springfish, Hiko White River springfish, White River spinedace, and Big Springs spinedace). A summary of the occurrence information for the federally listed species is provided below. Additional habitat and life-history information is provided in **Appendix F**, **Table F3.7-6**. Management guidance for special status fish and amphibian species is described in recovery plans, habitat-management plans, and conservation agreements (**Table 3.7-3**). This section is followed by a summary of the BLM Sensitive Species or groups, with more detailed discussions for those species with conservation agreements or public scoping interest.

Table 3.7-3 Management Guidance for Special Status Fish and Amphibian Species

Species	Status	Plan/Citation
Pahrump poolfish	FE, NVP	Recovery Plan Pahrump Killifish (USFWS 1980)
Big Springs spinedace	FT, NVP	Big Springs Spinedace Recovery Plan (USFWS 1993a); Big Springs Spinedace Monitoring and Nonnative Species Control Plan (NDOW 1999a); Big Springs Spinedace Recovery Implementation Plan (Draft) (NDOW 1999b); Condor Canyon Habitat Management Plan (Guerrero et al. 1989); Determination of Threatened Status and Critical Habitat for Big Springs Spinedace (USFWS 1985a)
Hiko White River springfish White River springfish Pahranagat roundtail chub White River speckled dace White River desert sucker	FE, NVP FE, NVP FE, NVP BLM, NVP BLM, NVP	Recovery Plan for the Aquatic and Riparian Species of Pahranagat Valley (USFWS 1998); White River Valley Native Fishes Management Plan (NDOW 2000), Pahranagat Valley Native Fishes Management Plan (NDOW 1999c); Final Rule to Determine Endangered Status and Critical Habitat for White River Springfish and Hiko White River Springfish (USFWS 1985b)
Moapa dace	FE, NVP	Recovery Plan for Rare Aquatic Species of the Muddy River Ecosystem (USFWS 1996)
White River spinedace Virgin River chub Moapa White River springfish Moapa Speckled dace	FE, NVP NVP NVP NVP	White River Spinedace Recovery Plan (USFWS 1994a); Determination of Endangered Status and Determination of Critical Habitat for White River Spinedace (USFWS 1985c); White River Valley Native Fishes Management Plan (NDOW 2000)
Bonneville cutthroat trout	BLM, USFS, NVP, UTSC, CA, GF	Conservation Agreement and Conservation Strategy for Bonneville Cutthroat Trout in the State of Nevada (NDOW 2006); Range-Wide Conservation Agreement for Bonneville Cutthroat (Utah) (Lentsch et al. 2000)
Least chub	C, BLM, UTSC, CA, UT Tier I Species	Conservation Agreement and Strategy for the Least Chub in the State of Utah (Bailey et al. 2007); Utah Comprehensive Wildlife Conservation Strategy (Sutter et al. 2005)
Northern leopard frog	P, BLM, NVP, UT Tier III Species	Northern Leopard Frog: A Technical Conservation Assessment (Smith and Keinath 2007); Utah Comprehensive Wildlife Conservation Strategy (Sutter et al. 2005)
Relict leopard frog	C, NVP, CA	Conservation Agreement and Rangewide Conservation Assessment and Strategy for the Relict Leopard Frog (Relict Leopard Frog Conservation Team 2005)
Columbia spotted frog	BLM, NVP, UTSC, CA; UT Tier III Species	Conservation Agreement and Strategy for the Columbia Spotted Frog (*Rana lutreventris*) in the State of Utah (Bailey et al. 2005); Utah Comprehensive Wildlife Conservation Strategy (Sutter et al. 2005)

Status: FE = Federally endangered; FT = Federally threatened; C = candidate; P = petitioned for federal listing; BLM = BLM sensitive species; NVP = Nevada Protected; NLD = No special status but species has limited distribution in Nevada; UTSC = Utah Special Concern; CA = Conservation agreement species; USFS = Forest Service sensitive species; Utah Tier I = federally designated species, including endangered, threatened, candidate, and proposed species, as well as "conservation species" covered through a multiparty conservation agreement; Utah Tier III = Utah species of conservation need; and GF = game fish species.

Federally Listed Species

Pahrump Poolfish (Federally Endangered) (Spring Valley). This species was originally called the Pahrump killifish, but it was assigned the common name *poolfish* in 1991. Historically, separate populations occurred in three springs in Pahrump Valley in Nye County. Two of these populations are extinct (Pahrump Ranch and Raycraft Ranch). The Manse Ranch Spring population was extirpated in 1975, but it was transplanted to other sites to provide refugia populations. Presently, introduced populations exist in an irrigation reservoir fed by Sandstone Spring (Spring Mountain Ranch State Park, Clark County), a refuge tank facility at Corn Creek (Clark County), and man-made ponds maintained by artesian wells in Shoshone Ponds ACEC (White Pine County). Pahrump poolfish are present in three of the four ponds (North Shoshone, Middle Shoshone, and Stock Pond) within the Shoshone Ponds Native Fish Refugium (**Figure 3.7-6**). No critical habitat has been designated for Pahrump poolfish, but a recovery plan was prepared in 1980 (USFWS 1980). Population numbers in North and Middle Shoshone Ponds during 2008 and 2009 ranged from approximately 200 to 250 fish. Numbers were higher in the Stock Pond (approximately 2,200 in 2008 and 3,800 fish in 2009 (Hobbs 2009). Recent surveys in August 2011 reported no poolfish in the North Pond; 826 poolfish in the Middle Pond; and 5,762 poolfish in the Stock Pond (NDOW 2011b).

Hiko White River Springfish (Federally Endangered) (Pahranagat Valley). This species occupies pools in Hiko and Crystal springs in the Pahranagat Valley, Lincoln County (USFWS 1998). This species was extirpated from Hiko Spring in 1967 but reintroduced in 1984. These springs and their associated open outflows were designated as critical habitat for this species in 1985.

Pahranagat Roundtail Chub (Federally Endangered) (Pahranagat Valley). Historically, Pahranagat roundtail chub occurred in Crystal Spring, Hiko Spring, Ash Spring, and the Pahranagat River in Lincoln County, Nevada (Stein et al. 2001). The present distribution of this species is limited to a small section of Pahranagat Creek on private land. A recent survey conducted in the fall of 2011 detected eight chubs in this section of the creek (Freeman 2012). A population also is maintained at the Dexter National Fish Hatchery and Technology Center in Dexter, New Mexico. A new refugium was established for this species in 2004 at the Key Pittman WMA near Hiko, Nevada. A total of 2,400 individuals were stocked in the former irrigation reservoir, which was lined and filled with well water. In 2011, Pahranagat chubs also were stocked in Cottonwood Springs, which is located within the Pahranagat National Wildlife Refuge (Freeman 2011). No critical habitat has been designated for this species, although the species was included in a recovery plan for aquatic and riparian species in the Pahranagat Valley (USFWS 1998).

White River Springfish (Federally Endangered) (Pahranagat Valley). Historic and present distributions of White River springfish are restricted to Ash Spring and its outflow in Pahranagat Valley, Lincoln County, Nevada. The majority of the population is found in the pool; however, fish occasionally occur in the outflow stream (Tuttle et al. 1990). Designated critical habitat includes Ash Spring (Lincoln County, Nevada), its outflow, and the surrounding land for a distance of 50 feet (USFWS 1998).

White River Spinedace (Federally Endangered) (White River Valley). Historically, the White River spinedace occurred in the White River, near the confluence with Ellison Creek in White Pine County and below Adams-McGill Reservoir in Nye County (USFWS 1994a). Historic distribution also included springs in White Pine County (Preston Big, Cold, Nicholas, and Arnoldson) and Nye County (Flag). The present distribution for this species is limited to Flag Springs and the upper portion of Sunnyside Creek, which includes a series of three springs and a stream segment in the Kirch WMA (USFWS 1994a). White River spinedace was introduced into Indian Ranch Spring, but the species no longer is present. Critical habitat was designated for three springs and their outflows, plus the surrounding land areas at a distance of 48 feet (Preston Big Springs and Lund Spring in White Pine County and Flag Springs in Nye County). Recent snorkel surveys in Sunnyside Creek and Flag Springs reported total spinedace counts of 748 in March and 671 in September of 2011 (NDOW 2011c). These numbers are lower than the maximum counts of approximately 2,800 spinedace in 2004. Surveys have been conducted during most years since 1991.

Moapa Dace (Federally Endangered) (Muddy River Springs Area). The Moapa dace is endemic to the upper Muddy River and tributary thermal spring systems within the Warm Springs area (USFWS 1996). The Moapa Valley Refuge was established in 1979 to secure habitat for Moapa dace. Historically, this species inhabited approximately 25 individual springs and 10 miles of stream habitat. The present population consists of approximately 6 miles of stream channel, supported by flow from 6 thermal springs (Nevada State Parks 2007; USFWS 1996). The types of habitat used by this species in the Warm Springs area include spring pools, spring outflows, and the mainstem portion

of the Muddy River (USFWS 1996). Habitat restoration has been implemented to improve the cover and the configuration of pools, riffles, and runs (Nevada State Parks 2007). A recent Memorandum of Understanding (MOA) regarding the groundwater withdrawal of 16,100 afy from the regional aquifer in Coyote Spring and California Wash basins established minimum instream flow levels that trigger conservation actions for the Moapa dace (USFWS 2006). The flow levels will be measured at the Warm Springs West Flume in the Moapa Valley NWR. Under the MOA, SNWA, the Moapa Valley Water District, and Coyote Springs Investments would restrict groundwater pumping from the Coyote Basin, if flow levels at the Warm Springs West Flume decline below 3 cfs. Details of the conservation measures that the SNWA is to implement as part of the MOA (USFWS 2006) are described in the Coyote Spring Well and Moapa Transmission System Project Final EA (SNWA 2007b).

Virgin River Chub (Nevada Protected) (Muddy River Springs Area, Lower Moapa, and California Wash Valleys). The Virgin River chub occurs within the Muddy River in Nevada and the mainstem portion of the Virgin River from Pah Tempe Hot Springs, Utah, downstream to the confluence with Lake Mead in Nevada (USFWS 1994b). The recovery needs of the Moapa population are covered in a separate plan (USFWS 1996). The Muddy River population is not considered to be part of the federal listing at this time. However, a proposed rule change regarding federal listing is under review by the USFWS. The present distribution of this species in the Muddy River extends from the Warm Springs area downstream to the Wells Siding Diversion (approximately 8 miles below the Meadow Valley Wash confluence). This species is usually associated with deep runs or pool habitats that have slow to moderate velocities and an abundance of cover provided by boulders, undercut banks or woody debris (USFWS 1996; 1994b). Spawning is suspected to occur in April through June (USFWS 1996).

Big Springs Spinedace (Federally Threatened) (Panaca and Dry Valleys). The present distribution of this species is restricted to a 4-mile section of Upper Meadow Valley Wash called the Condor Canyon reach, which is northeast of Panaca, Nevada. The boundaries of the occupied habitat area are defined by perennial flow. A barrier that consists of a falls at the north end of the canyon restricts movement. A second falls exists near private property, which also is a barrier to fish movement. Previous surveys in Upper Meadow Valley Wash showed that the species occurred throughout most of the canyon. Currently, the largest numbers of Big Springs spinedace exist below the upper barrier falls, near the Delmue property. Critical habitat also was designated for the species in a 4-mile section of Meadow Valley Wash (above and within Condor Canyon) in Lincoln County near Panaca, Nevada (USFWS 1985a).

Least Chub. The least chub was petitioned for listing under the ESA in 2007. The USFWS conducted a 12-month status review and released their finding in June 2010 (USFWS 2010). The USFWS determined that the status of the least chub was "warranted but precluded" and it was identified as a candidate species. The finding also concluded that current levels of water pumping represent a significant threat to least chub and contribute to the need to list the species. This species is endemic to the Bonneville Basin of Utah where it was once widely distributed and occupied a variety of habitats including rivers, streams, springs, ponds, marshes, and swamps (Sigler and Sigler 1983). Currently, there are five known wild, extant populations of least chub; three are in Snake Valley in Utah's West Desert (Leland Harris Spring Complex/Miller Spring, Gandy Salt Marsh Complex, and Bishop Springs Complex including Foote Reservoir Springs). Least chub also were transplanted into Walter's and Deadman springs in the Fish Springs NWR in 1995 and 1996 (Bailey et al. 2007) and Ibis and Pintail ponds in 2006 and 2007. Least chub introduced to Walter and Deadman springs (Fish Springs Flat) were replaced by mosquitofish. The USFWS considers these sites to be extirpated and unsuccessful. Since the transplantation and the completion of the initial Least Chub Conservation Agreement Strategy in 1998, the UDWR has had an ongoing monitoring program for least chub populations in Utah. This species has not been found in Deadman Spring since 1999 and the last observation at Walter's Spring occurred in 2001 (BIO-WEST 2007). Ibis and Pintail ponds have been monitored since their introduction. Although least chub has not been collected during monitoring, it could be present due to the large habitat area. The Snake Valley waterbodies also are used by other native fish species such as Utah sucker, Utah chub, speckled dace, redside shiner, and mottled sculpin (BIO-WEST 2007).

Bureau of Land Management Sensitive Fish Species

In total, 14 additional BLM sensitive or state-protected fish species occur within the overall region of study. The state-protected and the BLM sensitive fish species lists are generally the same (**Appendix F, Table F3.7-1**). All of these fish species are native to Nevada or Utah. The Bonneville cutthroat trout is associated with stream habitat. The other sensitive fish species are associated with spring environments (springfishes) or use both stream and spring habitats (dace and sucker species). Occurrence and habitat information is summarized below for the Bonneville

cutthroat trout, a BLM sensitive species with a conservation agreement. Habitat and life history information for the other special status species is provided in **Appendix F**, **Table F3.7-6**. The occurrence of special status fish species within the natural resources region of study springs is listed in **Appendix F**, **Table F3.7-7**.

Bonneville Cutthroat Trout. The Bonneville cutthroat trout was petitioned for listing under the ESA, but the 12-month finding determined that the species was not warranted for listing under the ESA. This species was associated with Lake Bonneville, which covered parts of southern Idaho, eastern Nevada, southwestern Wyoming, and western Utah during the late Pleistocene era. Remaining populations became isolated in remaining headwaters and streams within the Bonneville drainage basin; an estimated 90 percent of these rivers and streams in the basin once had populations of Bonneville cutthroat trout. Within the natural resources region of study, Bonneville cutthroat trout occurs in perennial streams within Steptoe, Snake, Spring (#184), and Deep Creek valleys (**Appendix F**, **Table F3.7-1**). This species is only native to drainages in Snake and Deep Creek valleys. Populations in the other two valleys are introduced and outside of their historic range. In Nevada, Snake and Silver creeks and their associated tributaries have been proposed as reintroduction streams.

Amphibians. Five special status amphibian species were evaluated in terms of potential occurrence within or near the natural resources region of study: Columbia spotted frog, northern leopard frog, relict leopard frog, Arizona toad, and western toad. Western toad was eliminated from further consideration, since it does not occur in the natural resources region of study. A summary of their occurrence within the overall region of study is described below with spring locations shown in **Figures 3.7-4** and **3.7-5** and listed in **Appendix F**, **Table F3.7-1**.

- Columbia Spotted Frog – This species was placed on a candidate list in 1993 (USFWS 1993b). After the Candidate Notice of Review was completed in 1999, the West Desert population was taken off the candidate list (USFWS 1999). Based on surveys or distribution accounts by BIO-WEST (2007) and Bailey et al. (2005), the Columbia spotted frog occurs in springs or wetlands within Tule Valley (Coyote, South Tule, Tule, and Willow), Snake Valley (Leland Harris, Twin, Beck Springs North, Gandy Salt Marsh, and Miller), and Deep Creek Valley (unnamed wetlands in the valley floor). The population in this geographical area is considered part of the West Desert population, which is not a federal candidate.
- Northern Leopard Frog – This species has been petitioned for listing under the ESA. A 90-day finding was issued and a 12-month status review was conducted to determine if listing the species in the western part of its range is warranted (USFWS 2009). The status review and 12-month finding concluded that listing the western population or the entire species is not warranted at this time (USFWS 2011). Records for the northern leopard frog include springs in Fish Springs Flat Valley (Crater, House, Lost, and South), Snake Valley (Leland Harris, Twin Springs, Gandy Marsh and Bishop Springs Complex including Foote Reservoir Springs and private land in the community of Gandy), Spring Valley (Blind, Cleveland Ranch, Keegan Ranch Complex, Shoshone Ponds area, McCoy Creek Ranch, North Millick, South Millick, Minerva Complex, West Spring Complex, and unnamed #5), Lake Valley (Wambolt Complex and Geyser Spring), Steptoe Valley (Grass Springs/Lusetti Ranch and an unnamed spring near Borchert Spring), and Pahranagat Valley (Big, Hoyt, L, and Maynard springs) (Freeman 2011; BIO-WEST 2009, 2007; SNWA 2009a). This species also occurs in wet meadows within the Shoshone Ponds area. In White River Valley, historical records for northern leopard frog were documented in Kirch Wildlife Management Area (Hot Creek) and Ruppos Bog Hole by Hitchcock (2001). Water in the wet meadows is maintained by free-flowing artesian wells. Several springs such as L, Cottonwood, and Maynard in Pahranagat Valley currently are being evaluated as translocation sites for this species.
- Relict Leopard Frog – This amphibian is a federal candidate species. Records for relict leopard frog include springs and wetlands in the Black Mountains Area (Blue Point, Gnatcatcher, and Rogers).
- Arizona Toad – This species, also commonly referred to as the southwestern toad, is found in scattered localities throughout southeastern Utah and southern Nevada. Within the natural resources region of study, it is primarily limited to Clark and Lincoln counties (NatureServe 2007). It has been collected in standing water with marsh or riparian vegetation within Meadow Valley Wash (BIO-WEST 2005).

Habitat for special status amphibians includes rivers, streams, lakes, reservoirs, springs, and wetlands during at least a portion of their development. Most amphibian species found within the study area use springs, and all special status amphibians may use springs in some capacity. All special status amphibian species found within the study area use riverine or stream environments to varying extents. Riverine habitats are used for feeding and cover. Undercut stream

banks are used by Columbia spotted frogs as overwintering sites (Wildlife Action Plan Team 2006). The northern leopard frog uses underwater areas as overwinter habitat. Arizona toads prefer streams for breeding.

Aquatic Invertebrates

Fifteen BLM sensitive aquatic invertebrates are present within the natural resources region of study (**Appendix F**, **Table F3.7-1**). The BLM sensitive species include California floater, the Pahranagat naucorid bug, the Moapa Warm Springs riffle beetle, and 12 snails or springsnails (**Appendix F**, **Table F3.7-1**). The California floater (Utah portion of Snake Valley) is the only invertebrate that occurs in larger rivers, streams, or lakes such as Pruess Lake in Snake Valley. This mollusk also has been reported from Redden Spring (north of Callao) in the Utah portion of Snake Valley. The Pahranagat naucorid bug lives among aquatic vegetation in spring and stream reaches in the White River drainage (USFWS 1998). The Moapa Warm Springs riffle beetle is restricted to the Warm Springs area within the Muddy River Valley (USFWS 1996).

Springsnails (or pyrgs), including the genera *Pyrgulopsis*, *Stenelmis*, and *Tryonia*, occur within the natural resources region of study and constitute the rarest and most unique macroinvertebrate fauna in the area. Springsnails are a group of mollusks found in perennial springs and seeps and usually are confined to the spring source and immediately downstream in the spring brook. Presence of species in this group is considered an important indicator of spring health. While springsnails as a whole can exist in a range of habitats, individual populations have been isolated by the distances between springs and seeps, and have become highly specialized to their habitats. Snails and springsnails have been reported from 17 of the basins within the overall region of study (**Appendix F**, **Table F3.7-1**). Springsnail occurrence within the region of study is listed in **Appendix F**, **Table F3.7-7**. The list of springsnail species includes those considered to be BLM sensitive or special status in Nevada or Utah. Other springsnail species are included in the list because they have limited distribution in Nevada or Utah.

Twenty-five BLM sensitive springsnails also have been petitioned for federal listing (**Appendix F**, **Table F3.7-1**). The current status of the petitioned species is that the USFWS negotiated a stipulated agreement with WildEarth Guardians that postpones a 12-month decision until the end of FY 2012 or early FY 2013 for four of the petitioned species that occur in the natural resources region of study (bifid duct pyrg, longitudinal gland pyrg, Hamlin Valley pyrg, and sub-globose Snake pyrg). The other petitioned species were included in a separate petition from the Center for Biological Diversity (2009). A 90-day finding on these species has not yet been published in the Federal Register.

The distribution of the petitioned springsnail (pyrg) species within the natural resources region of study is summarized by three categories, as listed below. Specific occurrence by springs is included in the impact analysis in Section 3.7.2, Environmental Consequences.

- Occurrence limited to one spring in one basin – Butterfield pyrg, Camp Valley pyrg, Emigrant pyrg, flat-topped Steptoe pyrg, Hamlin Valley pyrg, Lake Valley pyrg, Landyes pyrg, neretiform Steptoe pyrg, and sub-globose Snake pyrg.
- Occurrence in multiple springs in one basin – Corn Creek pyrg, Hubbs pyrg, longitudinal gland pyrg, Moapa pebblesnail, Moapa Valley pyrg, northern Steptoe pyrg, southeast Nevada pyrg, Spring Mountains pyrg, and White River Valley pyrg.
- Occurrence in multiple springs in multiple basins – Bifid duct pyrg, Flag pyrg, grated tyronia, Hardy pyrg, and Pahranagat pebblesnail.

Culturally Significant Fish

As indicated by the Confederate Tribes of the Goshute Reservation (Steele 2010), the region of study contains streams with various species of fish that are considered culturally significant in terms of food resources, spiritual resources, and traditional values. The occurrence of culturally significant fish species also would apply to other aboriginal territories used by the Western Shoshone, Chemehuevi, Southern Paiute, Hualapai, and Mojave Tribes. It is assumed that the fish would include native and non-native species. Based on aquatic species recovered from excavated sites in the Eastern Great Basin, freshwater mussels and fish (suckers, Utah chub, and salmon) were food sources (James 1981).

3.7.2 Environmental Consequences

3.7.2.1 Rights-of-way

Issues

The following issues for aquatic biological resources are discussed as part of the impact analysis for ROW construction and facility maintenance.

The number and type of waterbodies that are crossed or are located within project ROWs are an important impact parameter.

- Potential loss of individuals or habitat from short-term disturbance of stream channels by construction equipment.
- Potential loss of individuals or habitat from sediment delivery.
- Potential effects on fish spawning from habitat alteration.
- Effects of water use for hydrostatic testing and dust control on aquatic biota and their habitat.
- Potential damage to aquatic habitat and biota from fuel spills reaching a waterbody directly or leaching through soils.
- Potential direct mortalities to amphibians from vehicle traffic.
- Compliance with management objectives defined in recovery plans, conservation agreements, and state wildlife action plans for special status aquatic species.
- Potential effects on fish species traditionally used as food by regional Tribes.
- Short-term disturbance to aquatic habitat and species during pipeline and transmission line facility maintenance activities.

Assumptions

The following assumptions were used in the impact analysis for aquatic biological resources:

- Identification of aquatic habitat potentially affected by project actions focused on waterbodies that support aquatic species on a persistent basis throughout the year (perennial streams, springs, lakes, and reservoirs).
- Temporary (seasonal) waterbodies were considered as a general type of habitat in the ROW construction analysis, since they are used for amphibian breeding and early life stage development. However, seasonal waterbodies were not mapped.
- Temporary access roads and permanent roads would be located within the ROWs except for two 14-mile segments. No new road disturbance outside the ROWs would occur as a result of roads. The two 14-mile road segments do not cross perennial streams, springs, or wetlands.

Methodology for Analysis

Construction surface disturbance impacts were evaluated for each alternative using the following methods:

- The pipeline and transmission line ROWs were mapped along with access roads and other surface facilities. The location of these project facilities were related to perennial streams, ponds, lakes, and springs that are located within the corridors and footprint of the project facilities.
- For those waterbodies located within the ROWs, the affected environment section was used to identify the presence of game fish, native fish, and special status aquatic species.
- Literature information and the applicant's POD were used to describe the types of impacts that would result from pipeline and transmission line construction activities.
- As part of the impact analysis, impact parameters were used in combination with effects information for the purpose of quantifying impacts and as impact indicators. The impact parameters also allow comparison among alternatives or groups of alternatives. Examples of impact parameters for aquatic resources included the number of

waterbodies with game fisheries or special status aquatic species that are located within the pipeline and power line ROWs.

- The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect aquatic resources from ROW construction and operation activities.

3.7.2.2 Proposed Action, Alternatives A through C

Construction and Facility Maintenance

Pipeline construction would cross one perennial stream (Snake Creek in Snake Valley) that contains game fisheries and special status aquatic species (**Figure 3.7-2**). One other waterbody, Big Wash, would be crossed by the pipeline ROW in a section that is classified as an ephemeral stream. Water would be present in Big Wash during high flow such as the springtime runoff period. Open-cut trenching or jack and bore techniques would be used at the Snake Creek and Big Wash crossings in the Nevada portion of Snake Valley. Details on the construction procedures for stream crossings are provided in the POD. Open-cut trenching could result in impacts to aquatic biota, as discussed below for the habitat alteration, fish spawning, and water quality impact issues.

No springs would be crossed by the pipeline ROW. However, four springs are located within 500 feet and downgradient of the pipeline corridor. Three of these springs are unnamed and have not been inventoried for aquatic biological resources. The other spring (Big Springs in Snake Valley) is located 320 feet downgradient of the corridor. This spring contains fish (mottled sculpin, redside shiner, Utah sucker, Utah chub, and speckled dace) and springsnails (bifid duct pyrg and longitudinal gland pyrg) petitioned for federal listing.

Two perennial streams with game fisheries, Steptoe Creek in Steptoe Valley and Snake Creek in Snake Valley, would be crossed by a power line ROW. The Snake Creek crossing is the same corridor for the power line and pipeline ROW. Impact issues would include potential sedimentation and fuel spills and possible removal of riparian vegetation, as discussed below. Instream disturbance could occur if vehicles cross these streams during power line construction.

A construction support area is proposed for a location adjacent to the upper portion of Lower Meadow Wash near Caliente. However, the boundary for this area is located outside of the Meadow Valley Wash floodplain. This portion of Meadow Valley Wash contains potential habitat for rainbow trout and special status fish species (Meadow Valley Wash desert sucker and speckled dace). Since facilities for this construction support area would be located outside of the Meadow Valley Wash floodplain, impacts to aquatic species and their habitat are not expected.

In general, access roads would be located within the proposed pipeline and power line ROWs. There would be no additional surface disturbance outside the ROWs for access roads with two exceptions. These include a 14-mile road (south pipeline road) in northern Delamar Valley and southern Dry Lake Valley and a 14-mile road from the Gonder Substation. Improvements involving leveling along a 20-foot wide ROW would be required. Both of these road segments do not cross perennial streams or springs. Therefore, no surface disturbance or water quality changes involving sedimentation would affect perennial aquatic habitat or species.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on aquatic resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Habitat Alteration and Loss of Individuals

Two construction techniques have been proposed for stream crossings: 1) jack-and-bore beneath the water, or 2) open-cut trenching with temporary water diversion. If the jack-and-bore technique is used, instream disturbance would not occur within the channel. A work area would be required on both sides of the stream located outside of the channel. Open-cut trenching and backfilling within the trenchline at the Snake Creek crossing would result in the physical alteration of channel morphology including streambanks and bottom substrates. Assuming a ROW width of 200 feet and a stream width of 16 feet, the estimated instream disturbance would be approximately 3,200 square feet. Disturbance to the stream bottom could alter substrates or other types of structure that are used by fish as cover, feeding

areas, or spawning. Trenching also could result in possible mortalities to macroinvertebrates and small-size fish. Large-size fish are expected to move away from the construction area to avoid instream activities and noise. Based on previous studies, macroinvertebrate communities typically recolonize disturbed areas from pipeline construction within several months (Waters 1995). The BLM RMP Management Actions and BMPs would be followed regarding erosion control, limiting access roads across streams, and restoration of riparian vegetation (see management direction for Vegetation [VEG-23] and Appendix A of the FEIS for the Ely District [BLM 2008]).

The open-cut trenching with temporary water diversion method would maintain flow and associated aquatic habitat in a portion of the construction area and the entire stream wetted area downstream of the Snake Creek crossing, as defined in ACM A.5.77 (**Appendix E**). There would be a temporary reduction in wetted area or aquatic habitat in the trenched area of Snake Creek. This measure also would be used at the Big Wash crossing, if water was present during construction. The presence of water at the Big Wash crossing also would result in the addition of aquatic habitat at a 2 to 1 ratio (i.e., 2 acres of comparable aquatic habitat to every 1 acre affected by construction) (ACM A.5.78). The following information describes these measures:

- During pipeline construction, BMPs will be implemented to minimize effects to fish from the temporary rerouting of perennial flow in Snake Creek, and in Big Wash if water is present. Practices will comply with NDOW and the CWA permitting requirements (ACM A.5.77).
- Two acres of comparable habitat for every acre of lost habitat will be improved if construction across Big Wash occurs in a high water year and water is present (ACM A.5.78).

Power line construction could result in soil disturbance near Steptoe and Snake creeks, as well as possible instream habitat alteration because of any equipment crossing the stream. Impacts would be temporary and limited to the proximity of construction areas adjacent to or within the stream. The extent of bottom disturbance would be considerably less than described for pipeline trenching.

Vegetative cover along streambanks of a waterbody provides cover for fish, shading, bank stability, and increased food and nutrient supply because of the deposition of insects and vegetative matter into the watercourse. Disturbance to the streambank areas at the Snake Creek crossing may reduce cover and shading in a relatively small area (up to 100-foot wide) on each bank. Given the relatively small width of the disturbance area associated with the pipeline crossing, impacts would be considered minor relative to the entire stream system. These stream bank areas would be restored to preconstruction contours and stabilized slopes. Impacts to riparian vegetation would be reduced by implementing a 10-foot buffer strip adjacent to the pipeline ROW at the perennial stream crossing (ACM A.1.61). The details of this measure include:

The perennial stream bank disturbance area is relatively small (up to 100-feet wide on each bank), minimizing the impacts from reduced cover and shading.

- At a minimum, a 10-foot-long vegetation buffer strip or other erosion control measure such as straw bales will be maintained between the cleared ROW and the high-water mark of adjacent jurisdictional drainages if the time between clearing/grading is expected to exceed 10 days or a precipitation event is forecast.

Snake Creek supports one special status species, Bonneville cutthroat trout. Perennial sections of Big Wash also contain Bonneville cutthroat trout. Construction would not affect Bonneville cutthroat trout in these streams because occupied habitat is located upstream of the proposed pipeline crossings.

The power line ROW also would cross one perennial stream, Steptoe Creek, in Steptoe Valley. However, construction near this stream would not affect special status aquatic species, since none are present in this stream.

A construction support area is proposed for an area located adjacent to the upper portion of Lower Meadow Wash near Caliente. Although this section of Lower Valley Meadow Wash contains special status aquatic species (Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace, and southwestern Arizona toad [BIO-WEST 2005]), they would not be affected because surface disturbance would occur outside of the floodplain.

Conelusion. Aquatie habitat would be altered on a short-term duration by the pipeline eonstruetion in one perennial stream (Snake Creek) in Snake Valley. Ephemeral and intermittent streams sueh as Big Wash, Lexington Creek, and Chokeeherry Creek in Snake Valley also would be erossed by the pipeline ROW. No springs would be erossed by the pipeline ROW. The BLM BMPs would reduee impaets by limiting the number of road erossings aeross streams and restoration of riparian vegetation assoeiated with eonstruetion and maintenanee aetivities for this projeet. Loss of riparian vegetation from eonstruetion at the Snake Creek and other intermittent stream erossings would be a long-term impaet. ACMs would be used to minimize habitat alteration by maintaining flow at the Snake Creek and Big Wash erossings (if water is present), replaeing affeeted habitat in Big Wash at a 2 to 1 ratio, and establishing a 10-foot buffer at the Snake Creek erossing. Power line eonstruetion eould result in short-term disturbanee (soil and instream alteration) to two perennial streams (Steptoe and Snake ereeks).

Proposed mitigation measures:

ROW-AB-1: Habitat Restoration. If the open-eut treneh ing method is used, SNWA would restore substrate eomposition to preeonstruetion eonditions at the Snake Creek pipeline erossing using proeedures approved by the BLM and the NDOW. The results would be ineluded in the detailed Restoration Plan to be prepared for the projeet. Effeetiveness: This measure would be effeetive beeause it would restore substrate eomposition to preeonstruetion eonditions. Effeets on other resourees: Implementation of this measure would extend the eonstruetion disturbanee for a short-term period and result in temporary sedimentation.

ROW-AB-2: Avoidance of Instream Disturbance. Construetion of the power line at the Steptoe Creek erossing would avoid instream disturbanee from equipment and vehieles. Effeetiveness: This measure would be effeetive, sinee it would avoid disturbanee to Steptoe Creek. Effeets on other resourees: There would be no effeets of implementing this measure on environmental resourees.

Residual impaets inelude:

- Short-term temporary disturbanee to aquatie habitat and assoeiated speeies representing fish, maeroinvertebrates, periphyton, and maerophyte eommunities in perennial (Snake Creek) and intermittent streams (ineluding Big Wash).
- Long-term loss of riparian vegetation in a 100-foot seetion on either side of Snake Creek and intermittent stream erossings.

Fish Spawning

The eonstruetion sehedule has not yet been determined at this time. If eonstruetion oeeurred during the fall months, direet impaets eould affeet brown trout spawning aetivity, eause mortalities to eggs or young fish, or alter spawning habitat. The other trout speeies in Snake Creek (brook trout) would not be affeeted by eonstruetion beeause it oeeupies headwater areas loeated upstream of the proposed erossing. The spawning periods generally range from Oetober 1 through Deeember 1 for brown trout. The effeets of eonstruetion-related sediment on fish spawning are diseussed in the water quality effeets seetion. Mitigation measure ROW-AB-3 would be implemented to restriet eonstruetion during the brown trout spawning period. Measure ROW-AB-1 would restore ehannel substrate to preeonstruetion eonditions.

Conelusion. If eonstruetion oeeurs in the fall months, instream disturbanee at the Snake Creek erossing in Snake Valley eould disturb spawning aetivity and alter spawning habitat for brown trout. No RMP-management direetion, BMPs or ACMs are available to reduee impaets on trout spawning in Snake Creek.

Proposed mitigation measures:

ROW-AB-3: Spawning Restrictions. If the open-eut treneh ing method is used, timing restrietions between Oetober 1 and Deeember 1 would be required during pipeline eonstruetion at the Snake Creek erossing. If eonstruetion during this period is neeessary, SNWA would prepare a site-speeifie plan that adopts mitigation measures reeommended by the NDOW to minimize impaets to brown trout. Effeetiveness: This measure would be effeetive beeause it would eliminate effeets on brown trout spawning. Effeets on other resourees: There would be no effeets of implementing this measure on environmental resourees.

ROW-AB-1 (Habitat Restoration discussed above as mitigation for *Habitat Alteration*) also would result in reducing impacts to trout spawning habitat.

Residual impacts include:

- Potential short-term temporary disturbance to trout spawning habitat in Snake Creek.

Water Quality Effects

Instream construction activities would result in short-term increases in total suspended solids levels or turbidity in a section of the stream within or immediately downstream of the crossing. Other surface disturbance activities associated with work areas or access roads near streams also could contribute to short-term sedimentation. The extent of the area affected would depend on the type of soil composition and flow conditions. Streams with firm substrates such as sand, gravel, or cobble would exhibit lower levels of sedimentation compared to soft substrates such as silt. The extent of downstream movement of suspended sediment also would depend on flow and channel configuration. By constructing during a low flow period, movement of suspended sediment would be limited in downstream extent. The generation of a downstream turbidity plume is usually limited to the duration of instream construction (Reid and Anderson 1999). Typically, the peak in total suspended solids is associated with trench excavation.

Surface disturbance activities within the pipeline ROW also could contribute sediment to downgradient areas immediately outside of the corridor, if a precipitation event occurred after construction. As previously mentioned, Big Springs in Snake Valley is located downgradient and just outside of the pipeline ROW.

Increases in sediments entering the stream can adversely affect resident trout and other fish species by covering spawning and rearing areas, thereby reducing the survival of fish embryos and juvenile fish (Waters 1995). Excessive sedimentation also can fill in pool habitats and blanket structural cover for fish. Pool habitats provide important depth cover and overwintering habitat. The BLM BMPs would be followed regarding erosion control.

Vehicle and equipment use within and adjacent to waterbodies also could pose a risk to aquatic biota from fuel or lubricant spills. If fuel reached a waterbody, aquatic species could be exposed to toxic conditions. Impacts could include direct mortalities or reduced health of aquatic organisms. Impacts from fuel spills would be avoided by not allowing refueling to occur within 100 feet of streams (ACM A.1.43). Other ACMs would be implemented to reduce sediment and spill-related effects on water quality and aquatic biota. These measures are described in **Appendix E** as part of construction and storm water and erosion control activities. Reference numbers for these ACMs include A.1.40 and A.1.41 and A.1.43 through A.1.46, A.1.51, A.1.52, A.1.54 through A.1.59, and A.1.61 through A.1.68. Additional detail on sediment control is provided in Section 3.3, Water Resources. By implementing erosion control techniques as part of the Reclamation Plan, suspended sediment would be localized and expected to return to preconstruction levels within several days.

Conclusion. Construction activities at streams with standing or flowing water would result in short-term erosion and sedimentation. One perennial stream (Snake Creek in Snake Valley) would be crossed by the pipeline ROW. Soil disturbance within the ROW also could affect three unnamed springs and one named spring (Big Springs) in Snake Valley due to their location within 500 feet of the ROW boundary. Vehicle and equipment use within the ROWs also pose a short-term risk of fuel spills to aquatic habitat and species. These activities could alter water quality and cause physiological stress or mortalities. An ACM would restrict vehicle fueling within 100 feet of perennial streams. BMPs and numerous ACMs would be implemented to reduce erosion effects on waterbodies. These measures would result in low level impacts to aquatic habitat and species.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term sedimentation effects on one perennial stream (Snake Creek in Snake Valley) and intermittent streams (if water is present at the time of construction).

Construction Water Use

The SNWA is proposing to use groundwater or temporary construction wells for hydrostatic testing, dust control, trench backfill compaction, and fire suppression (if needed). It is estimated that between 5.5 and 8.7 million gallons of construction water would be needed for every pipeline mile (or one water supply well for each 10 miles of pipeline). Groundwater withdrawal for construction water use could result in localized drawdown effects. There could be potential short-term effects on surface water quantity and aquatic habitat depending on the hydraulic connection to groundwater and the surface water location. No diversion or modification of surface water flows is anticipated for temporary construction water use. However, any change in water use involving surface water sources would need to meet Nevada permit requirements, as well as a review by the BLM. If surface water use was approved, the BLM Ely BMP requirements involving the use of screening with a mesh size of 3/16 inch on intake hoses would be used to prevent fish from being entrained.

The discharge of hydrostatic test water would follow NPDES requirements, which would eliminate potential effects on water quality. Erosion effects would be minimized by implementing ACMs to reduce discharge velocities (ACM A.1.64 and A.1.65, as described in **Appendix E**). Additional details on hydrostatic test water discharge are provided in Section 3.4, Soil Resources.

Conclusion. Construction water use could adversely affect aquatic habitat and species, if surface water is located within the drawdown area and connected to groundwater sources.

Proposed mitigation measures:

As discussed in Section 3.3, Water Resources, mitigation measure ROW-WR-3 (Construction Water Supply Plan) would be required to determine the effects of construction water use on surface water and groundwater. Additional mitigation may be required, if surface water and aquatic habitats are adversely affected.

Residual impacts include:

- Residual effects from construction water use could occur if groundwater withdrawal reduces surface water quantity and aquatic habitat. Residual impacts will be quantified during subsequent BLM review of the Construction Water Supply Plan.

Vehicle Traffic/Equipment and Indirect Effects on Amphibians

Construction activity in areas near streams and temporary waterbodies (if present at the time of construction) would cross potential habitat for amphibian species such as Great Basin spadefoot toad. Stream habitat crossed by the pipeline and power line ROWs includes Snake Creek in Snake Valley and Steptoe Creek in Steptoe Valley. No springs or wetlands are located within these ROWs. Vehicle traffic within the ROW could potentially cause mortalities to toads and frogs during breeding movement to waterbodies in the spring or summer and post-breeding movement to upland areas in late summer or fall (Andrews et al. 2008). No direct effects are expected for northern leopard frog, since the closest spring or wetland (Maynard Spring) to the ROW is 0.8 mile, which exceeds the maximum migration distance of 0.25 mile reported by Seburn et al. (1997). There also would be no effects on other special status amphibian species such as Columbia spotted frog, relict leopard frog, or Arizona toad, since the ROWs or access roads would not cross their habitats. Construction activities within waterbodies could alter habitat used for eggs and rearing of young, as well as possibly causing direct mortalities. Vehicle traffic also could cause increased sedimentation in the disturbance area near waterbodies as discussed in Section 3.3, Water Resources. In total, vehicle traffic would occur along approximately 431 miles of access roads. A small portion of this ROW distance could be near temporary waterbodies (i.e., small ponded areas that can develop after substantial rainfall events), which could be used as breeding habitat by amphibians. ACMs to reduce vehicle and traffic issues include A.1.3, A1.11, and A.1.28 through A.1.37. Control measures for fuel and hazardous materials would be provided by ACMs A.1.43 through A.1.46.

Vehicle traffic could cause toad and frog mortalities during movement periods.

Amphibians also could be indirectly affected by construction-generated dust, noise, or accidental wildfire. The following ACMs would be implemented for these impacts: air emissions and dust (A.10.1 through A.10.8), construction noise (A.9.1 through A.9.3), and accidental wildfires (A.1.47).

Conclusion. Vehicle traffic along 431 miles of access roads could result in alteration of Great Basin spadefoot toad habitats (Snake Creek, Steptoe creek, and temporary waterbodies) and potential mortalities during breeding movements to waterbodies in the spring or summer and movement to upland areas in late summer and fall. Risk of mortalities would be highest near waterbodies. Construction traffic would be temporary and short term in duration. ACMs would be implemented to reduce impacts associated with vehicle traffic, construction dust and noise, and accidental wildfires.

Proposed mitigation measures:

None.

Residual impacts include:

- Potential short-term alteration of amphibian habitat if vehicles or equipment cause disturbance to waterbodies used by amphibians for breeding.

- Long-term effects on amphibians could occur if vehicles cause mortalities. The magnitude of potential mortalities would depend on the number affected, as well as population numbers for the species on a basin-wide distribution. Numbers could be reduced at particular waterbodies for one breeding year.

Compliance with Management Objectives

One special status species with a conservation agreement, Bonneville cutthroat trout, occurs near the ROW. Management objectives for the Bonneville cutthroat trout in Nevada are defined in the conservation agreement for this species (NDOW 2006). **Appendix F, Table F3.7-8** provides a list of the management objectives. Construction activities would not result in effects on habitat for Bonneville cutthroat trout in Snake Creek or Big Wash, since habitat is located upstream of the proposed pipeline crossings. Therefore, construction activities would not limit the achievement of management objectives for Bonneville cutthroat trout.

An impact issue for project maintenance could involve potential localized sediment and habitat disturbance.

Conclusion. Compliance with conservation agreements were evaluated for one special status species, Bonneville cutthroat trout. Since occupied habitat for the Bonneville cutthroat trout occurs in sections located upstream of proposed pipeline crossings of Snake Creek and Big Wash, construction activities would not conflict with conservation objectives for this species.

Proposed mitigation measures:

None.

Residual impacts include:

No residual effects on management objectives for Bonneville cutthroat trout.

Tribal Species

Snake Creek and Big Wash (pipeline and power line crossings) support one special status species, Bonneville cutthroat trout, and other native and non-native fish. These streams and their associated fish species also are located within the Confederated Tribes of the Goshute Reservation and are considered culturally significant species. Construction would not affect Bonneville cutthroat trout in these streams because occupied habitat is located upstream of the proposed pipeline crossings. Short-term disturbance to other fish species would occur as a result of construction. Implementation of ACMs (previously discussed in the habitat alteration and fish spawning sections) and mitigation measures ROW-AB-1, ROW-AB-3, and ROW-WR-1 would reduce impacts to habitat and fish species.

Steptoe Creek (power line crossing) in Steptoe Valley supports game fish species. Fish in Steptoe Creek are located within the Western Shoshone Tribe's aboriginal territory and may be considered culturally significant species. Implementation of mitigation measure ROW-AB-2 (no instream disturbance from vehicles and equipment) would avoid impacts to fish in Steptoe Creek.

Conclusion. Pipeline ROW construction would result in short-term impacts to Snake Creek and Big Wash, which contain fish traditionally used by the Confederated Tribes of the Goshute Reservation.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term temporary disturbance to fish habitat and associated species in Snake Creek and possibly Big Wash in Snake Valley.

Facility Maintenance

Routine maintenance of the pipeline and transmission line ROWs could consist of removing vegetation within the ROWs. Removal of riparian vegetation could affect overhanging cover in a small section of a stream. Surface disturbance also could disturb soil and contribute localized sediment to a waterbody if it is located immediately adjacent to the maintenance area. Pipeline repair within the waterbody would directly disturb aquatic habitat. However, the pipeline system is considered to be quite durable and therefore, repair activities are expected to be unlikely. Potential fuel spills from equipment near waterbodies also could be a risk to aquatic biota. However, impacts from fuel spills would be avoided by not allowing refueling to occur within 100 feet of streams (ACM A.1.43). Vehicle traffic near waterbodies could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods.

An impact issue for facility maintenance could involve potential localized sediment and habitat disturbance.

Proposed mitigation measures:

None.

Conclusion. Facility maintenance activities within ROWs could result in short-term effects on water quality, if surface disturbance occurred near Snake Creek or intermittent streams when water is present. Other potential effects would be the same as described for construction. The same BMPs and ACMs and mitigation measures would be applied to facility maintenance activities.

Residual impacts include:

- Same as construction, except that the magnitude would be lower due to the smaller amount of vehicle traffic and equipment use.

3.7.2.3 Alternative D

Construction and Facility Maintenance

Since no perennial streams or springs and associated biota are crossed by Alternative D ROWs, several of the impact areas discussed in the previous section are not applicable. The following information discusses the remaining potential impacts. The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on aquatic resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Habitat Alteration and Water Quality Effects

Construction and facility maintenance in Snake Valley and White Pine County would be eliminated under Alternative D. As a result, construction of the remaining ROWs and project facilities in Lincoln and Clark counties and the Lincoln County portion of Spring Valley would result in effects on intermittent streams. If water is present at the time of construction, aquatic habitat, and aquatic communities such as macroinvertebrates and attached algae or macrophytes could be affected as a result of habitat alteration and water quality (i.e., sedimentation and potential fuel spills). Fish species are unlikely to be present in the intermittent streams due to a lack of water on a consistent basis throughout the year. No special status aquatic species are known to occur in these intermittent streams. The same BMPs and ACMs would be applied to construction and facility maintenance activities to reduce water quality effects on aquatic habitat and species.

Conclusion. Construction and facility maintenance activities could result in short-term water quality effects, fuel spill risks, and habitat alteration in intermittent streams in Clark and Lincoln counties, if water is present during these activities. These effects would be considered minor due to the lack of water being present throughout the year. No game fish or special status aquatic species are present in these intermittent streams. Riparian vegetation could be removed on a long-term basis as a result of stream crossing construction. BMPs and ACMs would be applied to construction and facility maintenance activities to reduce effects related to these impact topics. No additional mitigation would be required for effects on intermittent stream habitat and their associated species.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term temporary disturbance to aquatic habitat in intermittent streams and macroinvertebrate, periphyton, and macrophyte communities.
- Streamside vegetation could be affected on a long-term basis at intermittent stream crossings.

Vehicle Traffic/Equipment and Indirect Effects on Amphibians

Vehicle movements within the 315 miles of access roads potentially could cause Great Basin spadefoot toad mortalities as they move to and from temporary waterbodies. Effects could range from habitat alteration to amphibian mortalities. The types of habitat that could be affected are temporary waterbodies, which would depend on whether water is present during construction or facility maintenance activities. Northern leopard frog would not be directly affected by ROW construction, since the closest springs or wetlands exceed the maximum migration distances reported for this species. Amphibians also could be indirectly affected by construction-generated dust, noise, or accidental wildfire. As discussed for the Proposed Action Alternative, the same ACMs would be implemented to reduce potential impacts to amphibians from vehicle traffic, fuel spills, noise, dust, and accidental fires.

Conclusion. Vehicle traffic and movement along the ROWs could result in short-term effects on amphibians, as they move to and from permanent and temporary waterbodies. Vehicles could disturb habitat in short-term alteration of habitat in temporary waterbodies. Effects could range from habitat alteration to amphibian mortalities. Construction would occur along 315 miles of access roads, with the mortality risk being highest near waterbodies.

Proposed mitigation measures:

None.

Residual impacts include:

- Potential alteration of amphibian habitat near permanent and temporary waterbodies and mortalities due to vehicle traffic within 315 miles of access roads.

3.7.2.4 Alternatives E and F

Construction and Facility Maintenance

Since no perennial streams or springs and associated biota are crossed by Alternatives E and F, several of the impact areas discussed for the Proposed Action are not applicable. The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on aquatic resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Habitat Alteration and Water Quality Effects

Construction and facility maintenance in Snake Valley would be eliminated under Alternatives E and F. If water is present at the time of construction, aquatic habitat and aquatic communities such as macroinvertebrates and attached algae or macrophytes could be affected in intermittent streams as a result of habitat alteration and water quality (i.e., sedimentation and potential fuel spills). Alternatives E and F would cross additional intermittent streams in the White Pine County portion of Spring Valley (several small washes and Bastian Creek). No fish species occur in the intermittent streams due to a lack of water on a consistent basis throughout the year. No special status aquatic species are known to occur in these intermittent streams. The same BMPs and ACMs would be applied to construction and facility maintenance activities to reduce water quality effects on aquatic habitat and species.

Conclusion. Construction and maintenance activities could result in short-term water quality effects, fuel spill risks, and habitat alteration in intermittent streams in basins crossed by ROWs. These effects would be considered minor due to the lack of water being present throughout the year. No game fish or special status aquatic species are present in these intermittent streams. Riparian vegetation could be removed on a long-term basis as a result of stream crossing construction. BMPs and ACMs would be applied to construction and maintenance activities to reduce effects related to these impact topics.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term temporary disturbance to aquatic habitat in intermittent streams and macroinvertebrates, periphyton, and macrophyte communities.
- Streamside vegetation could be affected on a long-term basis at intermittent stream crossings.

Vehicle Traffic/Equipment and Indirect Effects on Amphibians

Vehicle movements within the 388 miles of access roads could potentially cause Great Basin spadefoot toad mortalities as they move to and from permanent and temporary waterbodies. Effects could range from habitat alteration to amphibian mortalities. The types of habitat that could be affected are temporary waterbodies, which would depend on whether water is present during construction or facility maintenance activities. Northern leopard frog would not be directly affected by ROW construction, since the closest springs or wetlands exceed the maximum migration distances reported for this species. Amphibians also could be indirectly affected by construction-generated dust, noise, or accidental wildfire. As discussed for the Proposed Action Alternative, the same ACMs would be implemented to reduce potential impacts to amphibians from vehicle traffic, fuel spills, noise, dust, and accidental fires.

Conclusion. Vehicle traffic and movement along the ROWs could result in short-term effects on amphibians, as they move to and from temporary waterbodies. Vehicles could disturb habitat in short-term alteration of habitat in temporary

waterbodies. Effects could range from habitat alteration to amphibian mortalities. Construction would occur along 388 miles of access roads, with the mortality risk being highest near waterbodies.

Proposed mitigation measures:

None.

Residual impacts include:

- Potential alteration of amphibian habitat near permanent and temporary waterbodies and mortalities due to vehicle traffic within 388 miles of access roads.

3.7.2.5 Alignment Options 1 through 4

Impacts for Alignment Options 1 through 4 are identified in relation to the relevant segment of the Proposed Action (**Table 3.7-4**).

Table 3.7-4 Aquatic Biology Impact Summary for Alignment Options 1 through 4

Alignment Option	Analysis
Alignment Option 1 (Humboldt-Toiybe Power Line Alignment) **Option Description**: Change the locations of a portion of the 230-kV power line from Gonder Substation near Ely to Spring Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Impaets assoeiated with Alignment Option 1 would bc the same as the eomparable Proposcd Action segment (intermittent strcam erossings but no perennial stream or spring crossings).
Alignment Option 2 (North Lake Valley Pipeline Alignment) **Option Description**: Change the locations of portions of the mainline pipeline and electrical transmission line in North Lake Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Impacts associatcd with Alignment Option 2 would result in more impacts than the comparablc Proposed Aetion scgment. One pcrennial stream (Geyscr Creek) would be crossed by the pipeline and spanned by the power linc ROWs. This stream contains rainbow and brook trout. Impacts would include habitat alteration and short-term water quality ehanges due to sedimentation. Trenching eould result in mortalities to macroinvertebrates and small-size fish. Mitigation measures ROW-AB-1 (Habitat Restoration) and ROW-AB-3 (Spawning Restrictions) would be implemcnted to reduce impacts on habitat and trout spawning.
Alignment Option 3 (Muleshoe Substation and Power Line Alignmcnt) **Option Description**: Eliminate thc Gonder to Spring Valley transmission line, and construeting a substation with an interconnection with an intcrstate, high voltage power linc in Muleshoe Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Impacts for Alignment Option 3 would be less than the comparable Proposed Action segment beeause of the elimination of thc Steptoe Creek crossing associated with the Humboldt-Toiyabe Power Line ROW.
Alignment Option 4 (North Delamar Valley Pipeline and Powcr Line Alignmcnt) **Option Description**: Change the location of a short scction of mainlinc pipcline in Delamar Valley to follow an existing transmission line. **Applicable To**: All alternatives.	• Impacts for Alignment Option 4 would be thc same as the comparable Proposcd Action segment (i.e., no stream or spring crossings).

3.7.2.6 No Action

Under the No Action Alternative, the proposed project would not be constructed or maintained. No project-related surface disturbance would occur. Impacts to aquatic species and their habitat would continue at present levels as a result of natural conditions and existing and other proposed development within the project area. Habitat for aquatic species would continue to be influenced by natural events such as drought and fire and land use activities such as grazing, and existing water diversions. Management activities on public lands will be directed by the Ely and Las Vegas RMPs, which involve measures to maintain or improve aquatic habitat parameters such as riparian vegetation. Management guidance for other public lands in the project study area would be provided by the GBNP General Management and the Forest Plan for the Humboldt-Toiyabe National Forest.

3.7.2.7 Comparison of Alternatives

Table 3.7-5 provides a comparison of impacts for construction and facility maintenance of the action alternatives.

Table 3.7-5 Alternative Comparison of Aquatic Biological Resource Impacts for Construction and Facility Maintenance

Parameter	Proposed Action, Alternatives A through C	Alternative D	Alternatives E and F
Number of Perennial Streams with Game Fish Species Crossed by ROWs	1	0	0
Number of Perennial Streams with Game Fish Species Crossed by Power Line ROWs	2	0	0
Number of Springs with Aquatic Species Located within 500 feet of ROWs	4	0	0
Miles of Access Roads for Potential Great Basin Spadefoot Toad Mortalities	431	315	388

3.7.2.8 Groundwater Development and Groundwater Pumping

Issues

The following issues for aquatic biological resources are discussed as part of the impact analysis for ROW groundwater development and pumping.

Groundwater Development Construction and Facility Maintenance

- Potential loss of individuals or habitat from short-term disturbance of stream channels by construction equipment.
- Potential loss of individuals or habitat from sediment delivery.
- Potential effects on fish spawning from habitat alteration.
- Effects of water use on aquatic biota and their habitat.
- Potential damage to aquatic habitat and biota from fuel spills reaching a waterbody directly or leaching through soils.
- Potential direct mortalities to amphibians from vehicle traffic.
- Compliance with management objectives defined in recovery plans, conservation agreements, and state wildlife action plans for special status aquatic species.
- Potential effects on fish species traditionally used by regional Tribes.
- Short-term disturbance to aquatic habitat and species during facility maintenance activities.

Groundwater Pumping

- Potential effects on aquatic habitats and species, special status aquatic species and their habitats, and sensitive ecological areas because of reductions in surface water availability and quality caused by groundwater development.
- Compliance with management objectives defined in recovery plans, conservation agreements, and state wildlife action plans for special status aquatic species.
- Potential effects on fish traditionally used by regional Tribes.
- Potential effects of climate change on aquatic biological resources. Refer to Cumulative Impacts, Section 3.7.3.1.2 for a discussion of how climate change could contribute to groundwater development pumping effects on aquatic biological resources.

Assumptions

Groundwater Development Construction and Facility Maintenance

- Identification of aquatic habitat potentially affected by project actions focused on waterbodies that support aquatic species on a persistent basis throughout the year (perennial streams, springs, lakes, and reservoirs).
- Identification of aquatic habitat potentially affected by construction activities for groundwater development associated with the Proposed Action and Alternatives A through F included all waterbodies located within the groundwater development boundaries.
- Identification of aquatic habitat potentially affected by construction activities for groundwater development associated with Alternative B included all waterbodies located within approximately 1-mile of proposed diversion points.
- Compliance with management objectives included those defined in recovery plans, conservation agreements, and state wildlife action plans for special status aquatic species.
- Fish species traditionally used by Tribes included native and non-native species.

Groundwater Pumping

- Aquatic habitat potentially affected by groundwater drawdown included perennial streams, springs, permanent wetlands and mesic meadows, lakes, and reservoirs that were located within the 10-foot drawdown area as determined by groundwater modeling.
- Model-simulated flow changes for selected springs and streams also were used in determining pumping effects on aquatic habitat. Additional detail on assumptions used in the analysis is provided in Section 3.3, Water Resources.
- Risk to special status species populations is discussed if drawdown is predicted to affect a waterbody that supports a population with limited distribution (e.g., springsnail population in one spring and one basin).
- The magnitude of residual effects cannot be determined at this time because of the uncertainty regarding the magnitude of impacts and the level of impact reduction by ACMs and additional mitigation. Residual effects of pumping on environmental resources will be determined in subsequent NEPA analyses.
- Fish species traditionally used by Tribes included native and non-native species.

Methodology for Analysis

Groundwater Development Construction and Facility Maintenance

- Known aquatic biology resources (game fish and special status species) were identified for groundwater development areas in the basins for each alternative.
- Surface disturbance activities were described in general terms, since locations are not known at this time.
- As part of the impact analysis, impact parameters were used in combination with effects information for the purpose of quantifying impacts and as an impact indicator. The impact parameters also allow comparison amongst alternatives or groups of alternatives. Examples of impact parameters for aquatic resources included the number of waterbodies with game fisheries or special status aquatic species that could be affected by pumping.
- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect aquatic resources from ROW construction and operation activities.
- Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

Groundwater Pumping

- The pumping effects analysis for aquatic biology focused on aquatic habitat (perennial springs and streams) located within the 10-foot drawdown contour. If groundwater and surface water connectivity was determined, these waterbodies were considered as potentially affected by groundwater pumping in terms of water level or flow reductions. Further discussion of this connectivity determination is provided in Section 3.3, Water Resources, **Table 3.3.2-3**.
- Springs in valley floor settings where there is a shallow depth to groundwater (i.e. <100 feet) were assumed to be controlled by discharge from the regional groundwater flow system. The impact analysis assumed a high risk to valley floor springs and stream reaches located within the drawdown area where there is a shallow depth to groundwater.
- Springs and stream reaches fed by springs located within valley margin settings may be controlled by discharge from local, intermediate, or in some cases, the regional groundwater flow system. Considering the uncertainty associated with the source of groundwater discharge to these springs, the impact analysis generally assumed a moderate risk to valley margin springs and stream reaches fed by springs located within the drawdown area.

- Springs and stream reaehes fed by springs in upland areas (i.e., high elevation regions or mountain block settings) were assumed to be eontrolled by discharge from loeal or perched groundwater systems that arc unlikely to bc connected to the regional groundwater flow system. Thc impaet analysis assumed a low risk to springs and stream reachcs located in upland settings even if they were situated in the drawdown area.
- The typcs of impacts resulting from flow or water level reductions on aquatie biota were discussed in gcneral terms using available literaturc. As part of the hydrologic modeling, the pereent change in flow was estimated for individual springs or spring systems. In total, approximately 30 springs wcre analyzed with focus on the larger springs or stream segments within the hydrologie model study area. This step provided a quantitative estimate of flow changes for springs or streams in the study area. Seetion 3.3, Water Resourees, provides a detailed diseussion of the methodology used in the evaluation of pumping effects on perennial streams and springs.
- Pumping effeets to spring flow were assumed if the spring is thought to be hydraulically conneeted to the regional groundwater flow system, and either oeeurs within the groundwater drawdown area or is simulated to have a greater than 5 pereent flow reduction.
- Biologieal importance was based on the presenee of fish and special status aquatic speeies.
- Assumptions about the potential ehanges in aquatic habitats (habitat area and flows) from groundwater pumping do not ineorporate additional assumptions about the effects of elimate change beeause specifie long term effeets of elimate ehange are not presently known, and the ineremental contribution of elimate ehange effects to project effeets eannot be reasonably estimated. A general diseussion of elimate change effeets is provided in Section 3.7.3.1, Climate Change Effeets to Aquatie Biological Resourees.
- The COM Plan would be developed and implemented to monitor and mitigatc the effeets of pumping on aquatic resourees. The COM Plan would integrate proteetive measures from the following: BLM RMP Management Aetions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation reeommended in this EIS. The COM Plan also would be applied to other impaet issues discussed in this section.
- As part of the COM Plan, the BLM would coordinate with the MOU partner agencies to define data gaps prior to initiating subsequent NEPA tiers. Several years of data collection may be required for studies sueh as oeeurrenee of northern leopard frog and speeial status springsnails and flow/habitat relationships for special status aquatic speeies.

3.7.2.9 Proposed Action

Groundwater Development Area

Game Fish and Other Aquatic Communities

Sinee the loeation of well development facilities cannot be determined at this stage of the projeet, impaet diseussions are considered general in terms of applicability to aquatic biological resources within the pumping basins. Subsequcnt NEPA analyses will be required to deseribe impacts of construction at spccific facility locations.

The impaets of constructing wells, roads, feeder lines, and other support faeilities in Snake, Spring, Cave, Dry Lake, and Delamar basins potentially could includc thc same issucs discussed for thc pipelinc and powcr linc ROWs (Scction 3.7.2.2). Surfaee disturbanee and vehicle traffic eould: 1) direetly disturb aquatie habitats loeated within the footprint of eonstruetion areas; 2) eontribute sediment to drainages that eontain aquatie habitat; 3) cause watcr quality risks to aquatic biota from aecidental fuel spills; and 4) potentially result in amphibian mortalitics from vchiele traffie during movement periods. These impaets would oecur only if well development oeeurs within, adjaeent to, or immediately upstrcam/upslope of waterbodies that contain habitat for aquatie biota. Removal of riparian vegetation would be of long-term duration, whilc thc other impaets would be considered short-term. Sedimentation and spill-related impacts would be minimized by ACMs prcviously discussed for Proposed Action ROW arcas.

Well development also would require the use of drilling muds and small quantities of water. Drilling mud handling and disposal eould result in sedimentation if the aetivity oeeurred in drainages or ncar watcrbodics. Water for well development would bc trueked in by the drilling contractors. The souree of water is assumed to be from groundwater. Since well development water is not expeetcd to be obtained from local water sourees, reduetions in aquatic habitat are not expected.

Game fish or special status species habitat is present in two basins. Construction-related impacts could occur.

Construction-related impacts in the groundwater development areas potentially could affect aquatic biological resources in all five basins (Snake, Spring, Cave, Dry Lake, and Delamar). In total, 17 perennial streams (Snake and Spring valleys) (**Table 3.7-1**) and over 40 springs (all 5 basins) are located within or immediately adjacent to the boundaries of the groundwater development area (**Figures 3.7-4** and **3.7-5**). All of these waterbodies likely contain aquatic macroinvertebrates. When focusing on game fish and special status aquatic species, two of the basins contain stream and spring habitat with these species. Groundwater development areas in Spring and Snake valleys overlap with 13 and 4 streams, respectively, that support game fish species (**Table 3.7-1**). However, many of the stream reaches within the Snake and Spring valleys groundwater development areas have channel modifications such as irrigation canals. The occurrence of special status aquatic species is discussed below.

Special Status Aquatic Species

One special status fish species, Bonneville cutthroat trout (BLM sensitive and a conservation agreement species), occurs in Big Wash in Snake Valley. This stream is located within the Snake Valley groundwater development area. One additional perennial stream in Snake Valley, Big Springs Creek, also contains native fish species considered to be unique because of their limited distribution in Nevada.

Three springs located within the groundwater development areas (Blind, North Millick, and South Millick in Spring Valley) contain potential habitat for the special status amphibian species, northern leopard frog. Vehicle traffic near these springs could result in mortalities as frogs move to waterbodies particularly during the breeding season. Surface disturbance activities near these springs could directly alter habitat or affect water quality from sedimentation or fuel spill risks.

Springsnail species (Toquerville pyrg) also are present in spring habitats within two of the groundwater development areas: Spring Valley (unnamed spring near Cleve Creek drainage) and Snake Valley (unnamed spring southwest of Caine Spring). This springsnail species is not a special status species due to its more widespread distribution. Surface disturbance activities near these springs could directly alter habitat or affect water quality from sedimentation or fuel spill risks.

Compliance with Management Objectives

If direct disturbance occurred in spring habitat, achievement of the conservation objective involving protection of known or potential breeding sites could be affected for northern leopard frog (Smith and Keinath 2007) (**Appendix F**, **Table F3.7-8**). Vehicle traffic near springs and seasonal waterbodies also could affect the objectives involving protection of dispersal pathways and reducing road-related mortality. Groundwater development in spring areas also could affect management objectives for protecting spring and springbrook habitats, as described by the Nevada Wildlife Action Plan Team (2006) (**Appendix F**, **Table F3.7-10**).

Habitat alteration or other surface disturbance effects on Big Wash could affect management objectives for Bonneville cutthroat trout involving maintenance of natural hydrologic characteristics and enhancing connectiveness and opportunities for migration.

Maintenance activities for groundwater development could affect aquatic biota and their habitat, if vehicles or equipment crossed waterbodies. The types of impacts would be the same effects discussed for ROW areas. The location of facility maintenance activities cannot be defined at this time. Implementation of ACMs would be used to avoid or minimize effects on aquatic habitat. These measures would control sediment input to waterbodies and reduce fuel spill risks. Removal of riparian vegetation near waterbodies could affect shade and cover for aquatic species on a long-term basis.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on aquatic resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

As part of the COM Plan, ACMs, and the BLM Management Actions and BMPs for ROWs (**Appendices D** and **E**) also would be incorporated for the groundwater development areas, as applicable. The BLM RMPs for development near springs also would be followed, which specifies that surface water sources and associated riparian areas be maintained. Additional project-specific measures would be determined as part of subsequent NEPA analysis for specific project locations. As part of the programmatic level of analysis for this EIS, additional ACMs would be incorporated in future COM Plans and could include the following design features to reduce impacts to aquatic biological resources. Other measures may be added during subsequent NEPA analyses.

- Location of production wells, collector lines, power lines, and secondary substations will consider the presence of special status species and their habitat and avoid springs, streams, and riparian/wetland areas (ACMs B.1.1 and B.1.3); and
- Construction practices to meet permit requirements will be implemented on well drilling, abandonment, drilling, and water discharge (ACMs B.2.1 through B.2.3).

Conclusion. Construction of well pads, gathering pipelines, and electrical service lines could disturb up to 17 perennial streams and approximately 40 springs in the 5 groundwater basins. All of these waterbodies likely support macroinvertebrates. Game fish species occur in perennial streams in the Snake and Spring valleys' groundwater development areas. Special status species within the groundwater development areas include Bonneville cutthroat trout (one stream in Snake Valley) and northern leopard frog (three springs in Spring Valley). Potential effects on Bonneville cutthroat trout and northern leopard frog could conflict with management objectives in their conservation plans. BMPs and ACMs would be implemented to reduce water quality and potential fuel spill effects. Direct effects on habitat would be reduced by ACMs that would consider the presence of special status species when siting facilities.

Mitigation Recommendations:

GW-AB-1: Avoid Disturbance to Springs. Avoid direct disturbance to springs and wetlands in Spring and Snake valleys with known special status aquatic species by establishing a 0.5-mile buffer around these areas. Effectiveness: This measure would be effective, since it would eliminate impacts to species in spring and wetland habitats. Effects on other resources: There would be no effects of implementing this measure on environmental resources.

GW-AB-2: Avoid Disturbance to Streams. Avoid locating wells, new roads or other linear facilities within 0.5 mile of or parallel to perennial streams and riparian areas with game fish and special status species. Effectiveness: This measure would be effective, since it would eliminate impacts to aquatic habitat in perennial streams. Effects on other resources: There would be no effects of implementing this measure on environmental resources.

Potential residual impacts include:

- Potential amphibian mortalities from vehicle traffic near temporary or permanent waterbodies.

A summary of effects and protection measures (ACMs and additional mitigation) is provided in **Table 3.7-6**. This same tabular presentation is used in subsequent groundwater development impact summaries for Alternatives A through F and the No Action alternative.

Table 3.7-6 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Proposed Action Groundwater Development

Effects
• Construction could alter aquatic habitat on a short-term basis in 17 perennial streams and 5 springs with aquatic biological resources. Riparian vegetation near waterbodies could be affected on a long-term basis. Surface disturbance and vehicle/equipment could affect water quality from sediment input and risks from fuel spills on a short-term basis. • Instream activities in the spring or fall could affect trout spawning on a short-term basis. • Vehicle traffic near waterbodies could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods.

Table 3.7-6 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Proposed Action Groundwater Development (Continued)

Effects
• Special status Bonneville cutthroat trout could be affected in one stream within the groundwater development areas (Big Wash in Snake Valley). • Special status amphibian species could be affected in three springs within the groundwater development areas. • Springsnail species could be affected in spring habitats within two of the groundwater development areas (one unnamed spring in Spring Valley and one spring in Snake Valley).Conflicts with conservation management objectives could occur for two species: Bonneville cutthroat trout (Big Wash) and northern leopard frog (three springs). • Game fish species considered to be traditional values to regional Tribes could be affected in Snake and Spring valleys.
COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and mitigation recommendations.
BLM RMP Direction and ACMs
• BLM RMP direction for development near springs specifies that surface water resources and associated riparian areas be maintained. • ACM B.1.1 and ACM B.1.3 will consider the presence of special status species and their habitat in the location of production wells, collector lines, and secondary substations. • ACM B.2.1 through B.2.3 will implement permit requirements on well drilling, abandonment, drilling, and water discharge.
Proposed Mitigation
GW-AB-1 (avoidance of springs and wetlands with special status aquatic species) and **GW-AB-2 (establishing a 0.5-mile buffer near perennial streams with game fish and special status aquatic species)** would be implemented for the Proposed Action.
Conclusions
• By avoiding springs and streams with game fish or special status aquatic species, short-term disturbance would be limited to waterbodies with seasonal flow or limited water volumes. Macroinvertebrates likely would be present in these waterbodies. • Vehicle traffic could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods.
Potential Residual Impacts
• Potential amphibian mortalities from vehicle traffic near temporary and permanent waterbodies could occur during construction.

Groundwater Pumping

Pumping Effects Literature Review for Aquatic Habitat and Species (Background Information Applicable to All Alternatives)

Streams

The importance of a stream's flow regime for sustaining the biodiversity and ecological integrity of the aquatic environment is well established (Poff and Zimmerman 2010). Flow regime is considered the primary determinant regarding the structure and function of aquatic and riparian ecosystems for streams and rivers (Poff et al. 2010). Nearly all streams need to have some contribution from groundwater in order to provide reliable habitat for aquatic organisms (Winter 2007). The effects of stream flow changes on aquatic biota and their habitat have received considerable attention in the published literature. Of 165 papers reviewed by Poff and Zimmerman (2010), 152 (92 percent) reported negative ecological effects in relation to flow alterations. It should be noted that the majority of these studies evaluated changes related to relatively large flow alterations ranging from 50 to 100 percent compared to base flow conditions. This review indicated that there is a paucity of data in the low to middle range of flow alteration (0 to 50 percent). The overall conclusion of the literature review is that larger changes in flow alteration are associated with greater risk of ecological effects on aquatic communities. The effects of flow reductions on aquatic communities in streams are summarized below for habitat and aquatic biological groups (i.e., fish, invertebrates, and algae).

Habitat and Water Chemistry. The effects of flow reductions on stream habitat and water quality include decreases in water velocity, water depth, and wetted channel width (Dewson et al. 2007). The magnitude of change in aquatic habitat and water quality conditions depends on the quantity of flow reduction. Although flow reductions result in

decreased wetted habitat for aquatic species, the quantity of change is not a 1:1 relationship. Riffles and other shallow areas (e.g., backwaters, shoreline areas associated all habitats) are affected by reduced flows more dramatically than pool habitats.

Flow reductions can affect water quality characteristics in streams in terms of increased sedimentation, thermal regimes, and the potential concentration of other water constituents. In terms of water chemistry, sedimentation is often a consequence of reduced flow because lower velocities enable more sediment to settle out of the water column (Dewson et al. 2007). Water temperature usually increases with reductions in discharge in the summer, with the magnitude of change dependent on the volume of reduction compared to the stream volume, stream velocity, and the time of year. Sufficient information is not available in the model analysis used in this EIS to predict quantitative effects on habitat or water chemistry.

Fish. Based on the literature review by Poff and Zimmerman (2010), fish was the only aquatic biological group to consistently respond negatively to changes in flow magnitude. Under reduced flow conditions, fish responses were negative in all 10 studies, with 8 of the changes exceeding 50 percent compared to base flow conditions. Fish diversity showed a consistently large decline, especially where reduced flow exceeded 50 percent. Reductions in abundance and demographic parameters also were shown for fish in these studies. Fish species that spend most of their time in riffle habitats (e.g., dace and suckers) are more likely affected by reduced flow and depth (Bradford and Heinonen 2008). Based on literature reviews by Bradford and Heinonen (2008), Bunn and Arthington (2002), Lake (2003), and Poff and Zimmerman (2010), the following direct effects of flow reductions on fish habitat have been reported. Minimum or threshold flows have not been identified in relation to these habitat effects.

- Reduced water velocity, water depth, and wetted channel areas;
- Reduced depths and velocities over spawning and rearing areas;
- Reduced depths in overwintering pools;
- Potential restrictions in fish movement or migration due to reduced stream depths;
- Potential shift in habitat use from riffles and runs to pools for some species;
- Changes in quantity and types of cover (e.g., undercut banks, woody debris, substrate, turbulence) as depths are reduced; and
- Potential loss of riparian vegetation and overhanging cover for fish.

These literature reviews also have reported indirect effects of flow reductions on fish species. Critical life events such as spawning, early life development, growth, physiological functions, and competition are linked to flow regime in combination with other ecological factors (Bunn and Arthington 2002). The following indirect effects could occur as a result of flow changes:

- Adverse effects on fish growth as a result of changes in food sources consisting of macroinvertebrates;
- Adverse effects on physiological and ecological requirements as a result of water quality changes involving temperature and increased sedimentation;
- Potential increase in parasite infestation; and
- Potential shift to habitat conditions that favor exotic species such as carp and mosquitofish.

Macroinvertebrates. The response of macroinvertebrate communities to reduced flow has been the subject of recent literature reviews by Poff and Zimmerman (2010) and Dewson et al. (2007). Based on a review of studies involving relatively large flow reductions (approximately 60 to 100 percent compared to base flow conditions), results showed that macroinvertebrate abundance and diversity declined in most cases. As discussed for fish, the lack of data points throughout the entire range of flow changes makes it difficult to identify any threshold levels that result in macroinvertebrate responses. Studies reviewed by Dewson et al. (2007) indicated varying changes in macroinvertebrate abundance in relation to reduced flow. It was suggested that density decreased as a result of reduced habitat diversity and food sources and changes in competition and predation. In situations with increased abundance after flow

reduction, it was suggested that the reduction in wetted area resulted in a concentration of invertebrates in a smaller area. Flow reductions also usually result in compositional changes, as indicated by the number of taxa and their relative abundance. Compositional changes typically result from the effect of flow reduction on habitat suitability. Low flows would favor taxa that prefer slower velocities. Flow reductions also result in decreased macroinvertebrate taxonomic richness (i.e., number of taxa). Changes in water quality conditions due to increased temperature and sedimentation and altered attached algae assemblages also can contribute to changes in community composition and taxonomic richness.

As a result of low flow conditions, invertebrates can move from the surface of the stream bottom into the deeper substrate zone referred to as the hyporheic zones (saturated sediment area that exchanges water, nutrients, and fauna with flowing surface waters). Hyporheic water can be used as a thermal refuge for invertebrates because this deeper zone is often cooler than the surface water (Dewson et al. 2007).

Additional information on macroinvertebrate responses to flow reductions is provided in a study by McKay and King (2006). The study diverted between 28 and 97 percent of the total stream discharge in experimental reaches for the purpose of identifying macroinvertebrate responses. The diversions consistently reduced the mean density of total macroinvertebrates, mean density of sensitive mayfly/caddisfly/stonefly taxa, macroinvertebrate family richness (i.e., number of taxa), and density of a number of dominant taxa in the diversion reaches compared to control reaches. In terms of flow reduction effects on habitat, the entire range of diversions resulted in a decline in the wetted area or useable habitat for macroinvertebrates.

Field studies have demonstrated that mobile macroinvertebrate species, such as beetles and adult caddis and stoneflies, would disperse as flows decline (Boulton 2003). Those invertebrates that are unable to escape the aquatic environment may drift downstream or move upstream to more consistent water sources (Dewson et al. 2007). Time of the year, rapidity of the desiccation (drying), the duration, and the magnitude of the decreased flow all affect the severity of changes in the invertebrate community (Boulton 2003). As stream desiccation begins to occur, invertebrates with limited mobility experience mortality due to elevated temperatures and declining water quantity and quality (Dewson et al. 2007).

If flows are restored, recolonization is variable (Boulton 2003). Often mobile species will be the first to recolonize a restored stream, along with species with drought-resistant life stages. Less mobile and sensitive species will frequently lag in recolonization of an area. The ability and time frame of the aquatic invertebrate community to recover are dependent upon the proximity of a functional aquatic ecosystem that can recolonize the area.

Algae and Macrophytes. Flow regime is an important component of attached algae (periphyton) and macrophytes. Water velocity can affect the colonization, production, and composition of periphyton communities. Investigators have reported varying density changes in relation to reduced flows (Dewson et al. 2007). These contrasting results are probably caused by the different growth forms and physiological requirements of algae in stream environments. The periphyton community typically changes from a low-biomass diatom assemblage to a high-biomass filamentous green algal mat during low or reduced flows. This change occurs in response to increased temperatures, higher nutrient concentrations, and reduced current velocity. Responses of periphyton to reduced flow conditions also depend on the nutrient concentrations in the stream. In general, reduced flow or low flow increases the establishment and growth of macrophytes. Other factors involving nutrient concentrations and substrate play a role in macrophyte development.

Springs

Spring flow or discharge is an important component of spring habitat. Springs are points of concentrated discharge from groundwater flow systems (van der Kamp 1995). The stability and quantity of the flow mostly depends upon the extent and storage capacity of the contributing flow system. The size and configuration of the spring are dictated by flow quantity and topography in the area. Most large springs and some smaller spring systems generally support spring brook outflow habitat, hyporheic zones, downstream wetland and marsh habitats, and may contribute significant flow to associated tributary and first order stream and river systems such as the White and Muddy rivers (Wildlife Action Plan Team 2006). The following information summarizes the effects of flow or water level reductions on spring habitat and their associated aquatic biota. Available literature did not identify minimum flow or threshold water levels needed to maintain habitat and aquatic species populations in springs.

Habitat and Water Quality. The effects of flow reductions from groundwater pumping on spring habitat in southern Nevada were evaluated by Sada and Deacon (1994). Reductions in groundwater input to springs would result in decreased water depths and wetted area. The reduction in hyporheic zones and wetlands would decrease the areal extent or size of the spring. Water velocities and depth also would decrease in the spring inflow and outflow areas due to reduced groundwater input.

The magnitude and time frame of these habitat changes would depend on the quantity of decreased flow and the relative size of the spring. Small-size springs would be more susceptible to decreased spring discharges. Small springs could dry up if the water source is eliminated. If flow input is maintained to the spring, flow reductions would modify habitat in terms of depth and velocity changes, especially in riffle areas of spring brooks. Pool habitat would be affected by decreased depths and size.

Reduced groundwater input also can affect water quality in springs due to increased sedimentation, altered thermal regimes, and potential changes in the concentration of other water constituents. Flow reductions in riffle areas could result in sedimentation of gravel and cobble substrates. Lower flow also could modify the thermal dynamics of the spring system, which could have adverse effects on species adapted to particular temperature conditions in the spring.

Fish. Based on information provided in Sada and Deacon (1994) and literature summarized above for stream habitats, reduced groundwater input to springs would result in decreased fish abundance and diversity. These changes would result from direct and indirect effects on fish habitat and their ecological or physiological requirements. Habitat effects are related to the ecology of fish species. For example, the springfishes, spinedaces, and Pahrump poolfish utilize pool habitats for feeding, spawning, and other life processes. In contrast, sucker and dace species are associated with riffle areas for their ecological requirements (feeding, spawning, and other physiological requirements). The following direct effects of flow reductions on fish species in spring habitats have been identified.

- Reduced water velocity, water depth, and wetted areas in pool and riffle habitats;
- Reduced depths and velocities over spawning and rearing areas;
- Potential shift in habitat use from riffles to pools for some species; and
- Changes in quantity and types of cover (e.g., substrate, aquatic vegetation) as depths are reduced.

The following indirect effects on spring biota could occur as a result of flow changes:

- Adverse effects on fish growth as a result of changes in food sources consisting of macroinvertebrates;
- Adverse effects on physiological and ecological requirements as a result of water quality changes involving temperature and increased sedimentation; and
- Potential shift to habitat conditions that favor non-native species.

Invertebrates. Erman (2002) reported that the most diverse invertebrate assemblages were evident in the most stable springs, which showed the least change in water discharge and temperature during a 20-year period. Based on a long-term study of springs during varying drought conditions (Erman 2002), reduced flow or water levels resulted in decreased abundance and diversity of invertebrates, as well as compositional changes. The effects of reduced flows would likely be more pronounced in small springs where changes in habitat conditions would be more substantial. Literature pertaining to effects of flow reductions on stream invertebrates is considered to be applicable to the spring brook or outflow areas of springs. Flow changes could shift the occurrence of invertebrates along the spring brook segment. For example, spring invertebrates often move along a spring outflow gradient to change their thermal environment, locate better food sources, and find more suitable larval development sites. In addition, flow-related water quality changes could contribute to changes in community composition and taxonomic richness due to increased temperature and sedimentation and altered attached algae assemblages.

Reduced flow in springs also could affect springsnail populations. These mollusk species are restricted to spring sources and a limited distance of the spring brook (usually less than 600 feet) (Sada and Deacon 1994). Habitat

typically consists of aquatic macrophyte areas, moderate velocities of approximately 10 centimeters/second, sand and/or gravel substrates, and thermal or cold temperatures.

Algae and Macrophytes. The effects of flow reductions on attached algae in spring brook areas of springs would be similar to responses discussed for stream habitats. Flow reductions in pool areas of springs would decrease depths and wetted areas. These changes could alter existing macrophyte areas by affecting depth and substrate combinations that are preferred by plant species.

Pumping Effects Analysis

Based on evaluations of the model-predicted 10-foot groundwater drawdown contour for Proposed Action pumping and geology and groundwater characteristics, aquatic biological resources could be affected in portions of six basins during the full build out plus 75 years and full build out plus 200 years time frames (White River, Pahranagat, Lower Meadow Valley Wash, Spring [#184], Snake, and Lake) (**Appendix F**, **Tables F3.7-11** and **F3.7-12**). The analysis indicated that Proposed Action pumping could reduce flows or water levels in 27 to 30 standing water bodies (springs, ponds, or lakes) and 25 to 31 perennial streams that contain game fish or special status aquatic species at the full build out plus 75 years and full build out plus 200 years time frames. Three springs/ponds/lakes were predicted to be affected at full build out. The predicted 10-foot drawdown contour for Proposed Action pumping is shown for streams in **Figure 3.7-7** and springs in **Figure 3.7-8**. It should be clarified that there are uncertainties associated with the model analysis, as described in Section 3.3, Water Resources, Methodology, Assumptions, and Limitations, Model Uncertainty. This would apply to all impact discussions for individual alternatives, as well as cumulative impacts associated with each alternative.

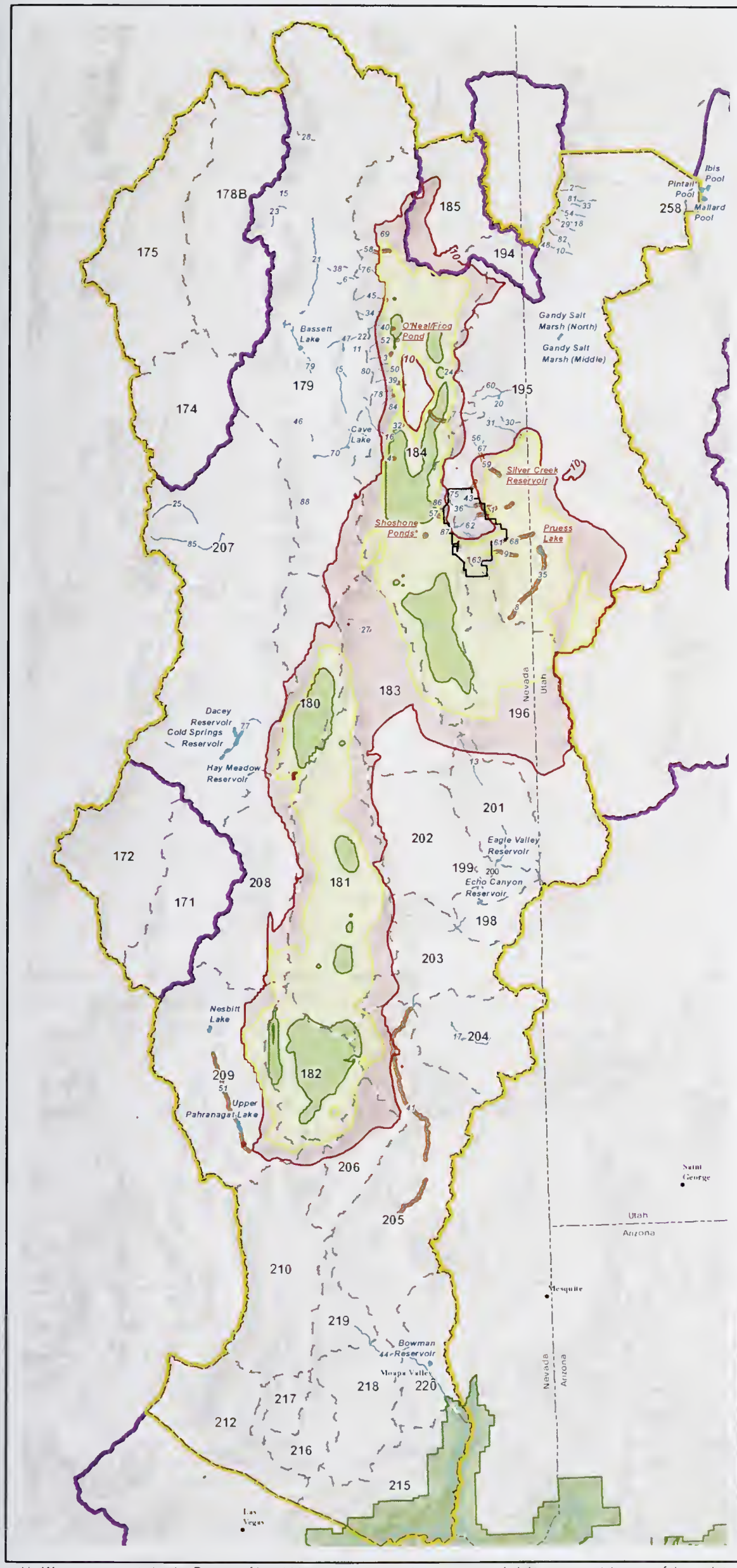
As part of the model simulation, percent change in flow was predicted for six springs located within the groundwater drawdown areas. The predicted percent flow reduction for these springs included the following ranges using the three model time frames: Butterfield Spring (-1 to -18) and Flag Springs (-1 to -17) in White River Valley; Keegan Spring (-58 to -100), North Millick Spring (-31 to -75), and South Millick Spring (-55 to -99) in Spring Valley; and Big Springs (-2 to -100) in Snake Valley. The model simulation results indicate that Keegan, North Millick, South Millick, and Big Springs could potentially experience substantial flow reductions or eventually cease flowing. Pumping impacts are discussed below for fish, amphibian, and invertebrate species.

Small springs (<100 gpm flow rate) also could experience substantial flow reductions or dry up as a result of pumping. The number of small springs with biological resources that could be affected was 0 (full build out), 13 (full build out plus 75 years), and 15 (full build out plus 200 years) for the three model time frames. The small springs included Wambolt in Lake Valley; Blind, Cleveland Ranch, Osborne, Stonehouse, Willow, unnamed near Cleve Creek, and unnamed # 5 in Spring Valley; and Caine, Clay, Kious, Outhouse, unnamed near Caine Springs, and two unnamed springs near Big Springs in Snake Valley. These springs could potentially dry up and result in a loss of all aquatic species (full build out plus 200 years).

Fish

Game Fish

Based on the groundwater drawdown analysis, game fish species could be affected in 4 to 29 streams for the 3 model time frames (full build out, full build out plus 75 years, and full build out plus 200 years). The analysis was based on the stream's topography and relationship to the 10-foot groundwater drawdown contour. If a valley floor or valley margin perennial stream overlapped with the 10-foot groundwater drawdown contour, potential stream flow reductions could result from Proposed Action pumping. During the full build out model time frame, flow reductions were predicted in four streams (Bastian, Meadow, Negro, and Shingle creeks). The analysis indicated that a total of 6 miles was located within the 10-foot drawdown contour. The full build out plus 75 years and full build out plus 200 years time frames indicated that 24 and 29 streams, respectively, could exhibit reduced flows. A list of these streams and their game fish species is provided in **Appendix F**, **Table F3.7-12**. Some of these stream reaches also contain non-native fish species. The analysis indicated that a total of 60 and 75 stream miles, respectively, were located within the 10-foot drawdown contours for these 2 model time frames. Stream flows could be affected within these stream lengths as well as downstream reaches. Game fish streams with the highest predicted affected lengths included Big Wash, Lehman, Silver, and Snake creeks in Snake Valley and Bastian, McCoy, Meadow, Negro, Shingle, and Siegel creeks in Spring Valley (**Appendix F**, **Table F3.7-12**). Water levels also could be reduced in two reservoirs that contain game fish (Pruess Lake and Silver Creek Reservoir in Snake Valley) (**Appendix F**, **Table F3.7-11**).



#	Stream Name	#	Stream Name
1	Baker Creek	46	Murry Creek
2	Basin Creek	47	North Creek
3	Bassett Creek	48	North Fork of Birch Creek
4	Bastian Creek	49	North Fork Snake Creek
5	Berry Creek	50	Odgers Creek
6	Big Indian Creek	51	Pahranagat Creek
7	Big Negro Creek	52	Piermont Creek
8	Big Springs Creek	53	Pine Creek
9	Big Wash	54	Red Cedar Creek
10	Birch Creek	55	Ridge Creek
11	Bird Creek	56	Second Fork Silver Creek
12	Board Creek	57	Shingle Creek
13	Camp Valley Creek	58	Siegel Creek
14	Cave Creek	59	Silver Creek
15	Cherry Creek	60	Smith Creek
16	Cleve Creek	61	Snake Creek
17	Clover Creek	62	South Fork Baker Creek
18	Cottonwood Creek	63	South Fork Big Wash
19	Deadman Creek	64	South Fork Snake Creek
20	Deep Canyon Creek	65	South Fork Willard Creek
21	Duck Creek	66	South Taft Creek
22	East Creek	67	Spring Creek (Tributary to Silver Creek)
23	Egan Creek	68	Spring Creek (Tributary to Snake Creek)
24	Eightmile Creek	69	Spring Valley Creek
25	Ellison Creek	70	Steptoe Creek
26	Forest Home Creek	71	Steptoe Ranch Stream 3
27	Geyser Creek	72	Steptoe Ranch Stream 4a
28	Goshute Creek	73	Steptoe Ranch Stream 4b
29	Granite Creek	74	Steptoe Ranch Stream 5
30	Hampton Creek	75	Strawberry Creek
31	Hendry's Creek	76	Sunkist (North) Creek
32	Indian Creek	77	Sunnyside Creek
33	Indian Farm Creek	78	Taft Creek
34	Kalamazoo Creek	79	Tailings Creek
35	Lake Creek	80	Timber Creek
36	Lehman Creek	81	Tom's Creek
37	Little Negro Creek	82	Trout Creek
38	Mattier Creek	83	Upper Snake Creek
39	McCoy Creek	84	Vipont Creek
40	Meadow Creek	85	White River
41	Meadow Valley Wash	86	Willard Creek
42	Middle Fork Snake Creek	87	Williams Canyon Creek
43	Mill Creek	88	Willow Creek
44	Muddy River		
45	Muncy Creek		

Underlined streams may be affected where "At Risk" stream segments intersect drawdown.

Potentially Affected "At Risk" Stream Segment

Potentially Affected "At Risk" Waterbody

Legend

Water Features Containing Sensitive Aquatic Biology or Game Fish

- Perennial Stream Reach
- Waterbody
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

* Fed by artesian well

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-7

Proposed Action Drawdown and Streams/ Waterbodies with Aquatic Biological Resources

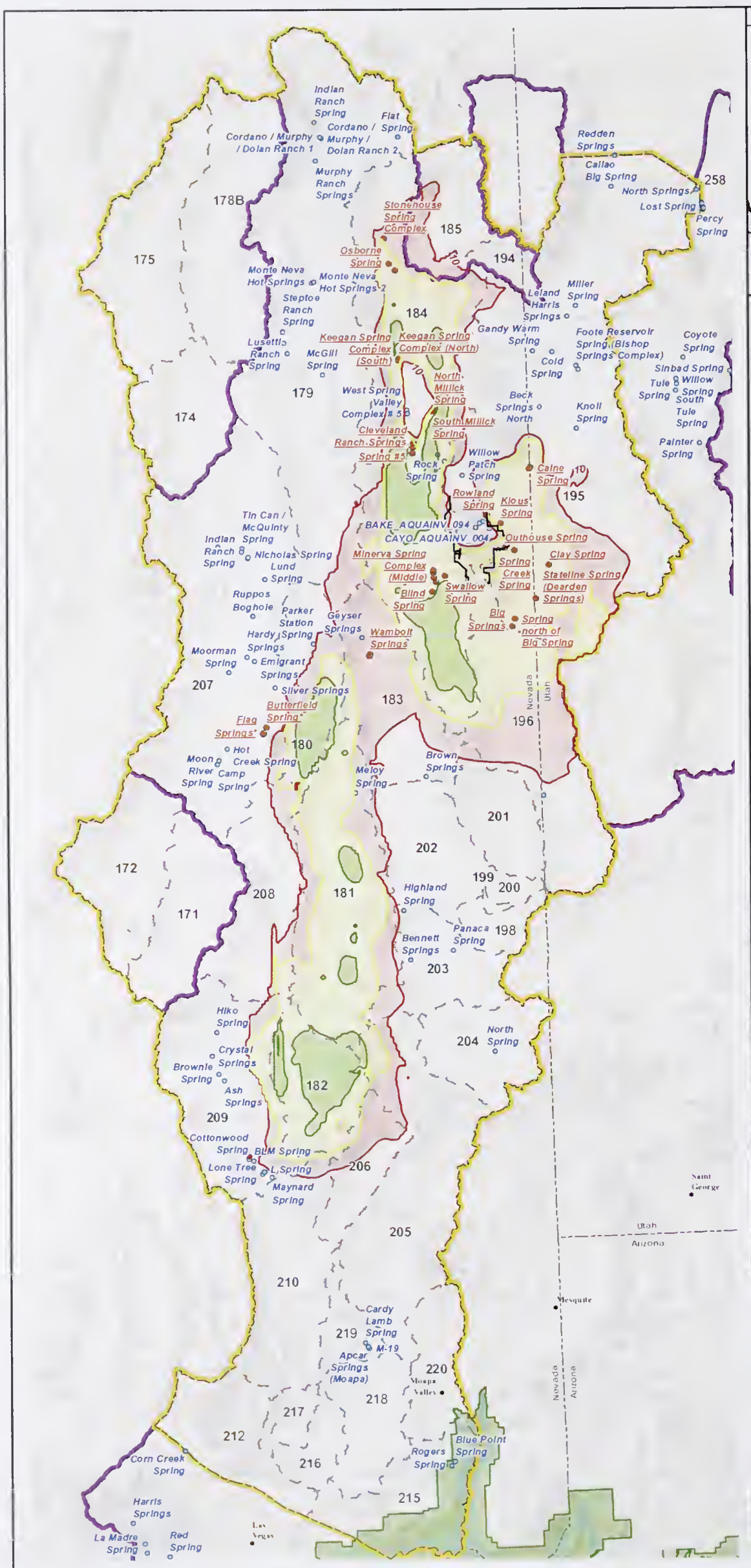
0 5 10 15 20 25 50 Miles

0 5 10 15 20 25 50 75 Kilometers

1:2,000,000

N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual use or aggregate use with other data



Legend

- Spring Containing Sensitive Aquatic Biology or Game Fish
- Potentially Affected Spring Containing Sensitive Aquatic Biology or Game Fish
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

*Spring is outside 10-ft drawdown contour, but model-predicted flow reductions indicate potential effect.

Basin #	Basin Name	Basin #	Basin Name
171	Coal Valley	202	Patterson Valley
172	Garden Valley	203	Panaca Valley
174	Jakes Valley	204	Clover Valley
175	Long Valley	205	Lower Meadow Valley Wash
178B	Butte Valley (Southern Part)	206	Kane Springs Valley
179	Steptoe Valley	207	White River Valley
180	Cave Valley	208	Pahroc Valley
181	Dry Lake Valley	209	Pahranagat Valley
182	Delamar Valley	210	Coyote Spring Valley
183	Lake Valley	212	Las Vegas Valley
184	Spring Valley	215	Black Mountain Area
185	Tippett Valley	216	Garnet Valley
194	Pleasant Valley	217	Hidden Valley (North)
195	Snake Valley	218	California Wash
196	Hamlin Valley	219	Muddy River Springs Area
198	Dry Valley	220	Lower Moapa Valley
199	Rose Valley	258	Fish Springs Flat
200	Eagle Valley		
201	Spring Valley		

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-8

Proposed Action Drawdown and Springs with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles
0 5 10 15 20 25 50 75 Kilometers
1:2,000,000
N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

Proposed Action pumping also could reduce water levels in two springs (Swallow Spring in Spring Valley and Rowland Spring in Snake Valley) that support trout populations. Based on overlap with the 10-foot groundwater drawdown contour, water levels in Swallow Spring could be reduced at full build out plus 75 years and full build out plus 200 years. No data are available to predict the percent flow change for these springs. In Rowland Spring, flow reductions were predicted only at full build out plus 200 years. Spring Creek Spring in Snake Valley, which provides water for the Spring Creek Rearing Station (**Figure 3.7-2**), could be affected by groundwater pumping at the full build out plus 75 years and full build out plus 200 year time frames.

Federally Listed Aquatic Species

Seven federally listed fish species were evaluated as part of the pumping effects analysis. Based on a comparison of the 10-foot groundwater drawdown contours and model-predicted flows, Proposed Action pumping could affect 2 species, Pahrump poolfish and White River spinedace. Results of the impact analysis are discussed below:

- **Pahrump Poolfish**: Proposed Action pumping could potentially reduce flows or water levels in Shoshone Ponds in Spring Valley inhabited by Pahrump poolfish for two model time frames (full build out plus 75 years and continuing through full build out plus 200 years). No flow reductions were predicted for the full build out time frame. Data are not available to predict the percent change in flow resulting from Proposed Action pumping.
- **White River Spinedace**: Although the Flag Spring complex in White River Valley occupied by this species is not located within the 10-foot groundwater drawdown contour, model-simulated flow reduction was 17 percent for the full build out plus 200 years time frame. Flow reductions in the Flag Spring complex for the full build out and full build out plus 75 years are <1 and 7 percent, respectively, for these model time frames. Critical habitat for White River spinedace is designated in Flag Spring. Proposed Action pumping would not affect White River spinedace habitat at other locations (Preston Big Springs and Lund Spring in White Pine County, which are considered critical habitat but not occupied habitat for the species).
- **Other Federally Listed Species**: Since the 10-foot groundwater drawdown contour did not overlap with habitat for the other 5 federally listed species (Hiko White River springfish, Pahranagat roundtail chub, Big Springs spinedace, Moapa dace, and White River springfish), Proposed Action pumping would not affect these species. The predicted flow changes in waterbodies inhabited by these species ranged from 0 to -2 percent (Preston Big Springs in White River Valley; Ash, Crystal, and Hiko springs in Pahranagat Valley; and Muddy River in Muddy River Springs Area). Specific analyses for these species are provided in **Appendix F**, **Table F3.7-13A**. As discussed in Section 3.3, Water Resources, on model uncertainty and limitations, a simulated change in flow of less than 5 percent is inferred to indicate that measurable impacts are unlikely to occur for the species.

Other Special Status or Native Fish Species: Based on the model analysis, additional fish species or subspecies such as White River sculpin, White River desert sucker, White River speckled dace, relict dace, Meadow Valley Wash desert sucker, Meadow Valley Wash speckled dace, Pahranagat speckled dace, Utah chub, Utah sucker, redside shiner, speckled dace, and mottled sculpin potentially could be affected by Proposed Action pumping. Spring species are listed in **Appendix F**, **Table F3.7-11**, while stream species are provided in **Appendix F**, **Table F3.7-12**. Impacts are discussed separately for these two habitats. Impact analyses organized by species are provided in **Appendix F**, **Table F3.7-13A**.

Bonneville cutthroat trout could be adversely affected by Proposed Action pumping in six streams at the full build out plus 75 years and full build out plus 200-year time frames. No streams containing this species would be affected at full build out. The estimated stream lengths with potential flow reductions for these two longer term time frames are listed below along with the percent of occupied habitat potentially affected in each stream and time frame.

- Spring Valley – Pine Creek (0.1 to 0.4 mile or 12 to 50 percent of occupied habitat in this stream) and Ridge Creek (0.6 to 1.1 miles or 50 to 92 percent of occupied habitat in this stream).
- Snake Valley – Big Wash (4.8 miles or 100 percent of occupied habitat in this stream), Hendry's Creek (0.2 to 0.4 mile or 2 to 8 percent of occupied habitat in this stream), Strawberry Creek (0.8 mile or 12 percent of occupied habitat in this stream), and Snake Creek (0.1 mile or 1 percent of occupied habitat in this stream).

Other Bonneville cutthroat trout streams in Spring (#184), Snake, Steptoe, and Deep Creek valleys (**Appendix F, Table F3.7-2**) would not be affected by Proposed Action pumping because the occupied habitat is located outside of the 10-foot drawdown contour or it is considered low risk due to their occurrence in mountain block areas. Two additional streams (Silver and Snake creeks in Snake Valley), which have been targeted as future reintroduction sites, could have reduced flows as a result of pumping at the full build out plus 75 years and full build out plus 200 years time frames.

Seven streams (Big Springs, Lake, Snake, Strawberry, Spring Valley, Pahranagat, and Lower Meadow Valley Wash) that support native non-game fish species could be affected by Proposed Action pumping. Big Springs and Lake creeks support mottled sculpin, redside shiner, speckled dace, Utah chub, and Utah sucker. Strawberry Creek contains mottled sculpin, redside shiner, and speckled dace. The estimated miles located within the 10-foot drawdown contour is 27 miles at full build out plus 75 years and 34 miles at full build out plus 200 years. These stream reaches could have reduced flow due to Proposed Action pumping.

Special status fish species also occur in eight spring or pond locations including Butterfield and Flag Spring complex in White River Valley; Keegan, Stonehouse Spring complex, and Shoshone Ponds in Spring Valley; and Stateline and Big Springs in Snake Valley. Based on overlap with the 10-foot groundwater drawdown contour with occupied habitat for these species, potential flow reductions were predicted for Keegan Spring, Shoshone Ponds, Stonehouse Spring complex, and Stateline Springs. The estimated flow reductions for springs with available data included 2 to100 percent for Big Springs, 58 to 100 percent for Keegan Spring, and 1 to 18 percent for Butterfield Spring and 1 to 17 percent for Flag springs. The highest flow changes were predicted for the full build out plus 200 years time frame. Minor flow changes are predicted for least chub habitat in Foote Reservoir Springs due to the predicted percent reductions of 0 to 2.

Tribal Species

Native and non-native fish species potentially affected in Snake, Spring, Lake, and Lower Meadow Valley Wash basin streams (**Appendix F, Table F3.7-12**) are considered traditional values to regional Tribes. Streams and species affected are the same as discussed for game fish and special status species. The majority of the affected streams are located in Spring and Snake valleys.

Amphibians

Based on the modeling analysis, Proposed Action pumping potentially could affect habitat for one special status amphibian species, northern leopard frog. Impact analyses organized by species are provided in **Appendix F, Table F3.7-13B**. Northern leopard frog populations could be affected by pumping in 9 waterbodies in the full build out plus 75 years time frame and 10 waterbodies at the full build out plus 200 years time frame. These include Blind, Cleveland Ranch, Keegan, Minerva, North Millick, South Millick, and unnamed #5 springs and Shoshone Ponds (artesian well water sources) and O'Neal/Frog Pond in Spring Valley; and Wambolt Spring in Lake Valley. Model flow simulation results were available for three of the springs inhabited by this amphibian species. Model-simulated flow reductions ranged from 58 to 100 percent in Keegan Spring, 31 to 75 percent in North Millick Spring, and 55 to 99 percent in South Millick Spring. Flow changes in the springs would occur in one or both of the full build out plus 75 years and full build out plus 200 years time frames (**Appendix F, Table F3.7-11**). As discussed for fish species, flow reductions could result in substantial loss of wetted areas in these springs or ponds. Pumping effects on northern leopard frog habitat in Foote Reservoir are unlikely, based on the flow prediction analysis. Data are not available to predict percent flow changes in the other springs inhabited by this species. The effects of Proposed Action pumping on northern leopard frog would include reductions in habitat used for breeding and early development and adult life stages.

Proposed Action pumping also could adversely affect habitat for Arizona toad. The analysis indicated that flow could be reduced in a 3.3 mile length of Lower Meadow Valley Wash during the full build out plus 200-year time frame.

As discussed in the Utah pumping effects analysis section below, pumping effects on Columbia spotted frog habitat in Tule and Snake valleys are unlikely. Pumping would not affect relict leopard frog habitat in the Black Mountains area.

Invertebrates

Proposed Action pumping could adversely affect habitat for special status springsnails in seven springs (**Appendix F, Table F3.7-11**) and one perennial stream, Big Springs Creek (**Appendix F, Table F3.7-12**). Based on the model results, flow reductions could occur in seven and eight waterbodies, respectively, at the full build out plus 75 years and

full build out plus 200 years time frames. Impact analyses organized by species are provided in **Appendix F**, **Table F3.7-13C**. Six petitioned species (Butterfield pyrg, Hardy pyrg, Flag pyrg, bifid duct pyrg, longitudinal gland pyrg, and Lake Valley pyrg) could be adversely affected by pumping, as discussed below. Pumping effects on the petitioned sub-globose Snake pyrg, which occurs in Foote Reservoir Springs in Utah, are unlikely, based on the flow prediction analysis.

- Bifid Duct Pyrg – Proposed Action pumping could reduce flows in one (Big Springs in Snake Valley) of three springs inhabited by this species in Nevada. The simulated flow reduction in this spring ranged from 2 to 100 percent for the 3 time frames. The 100 percent reduction at the two long-term time frames indicates that there could be a total loss of habitat for the species, which would eliminate the population at this location. Populations exist at two other springs in Spring Valley (Rock and Turnley/Woodsman), which would not be affected by Proposed Action pumping.
- Longitudinal Gland Pyrg – Flows could be reduced in four springs (Big Springs, unnamed spring north of Big Springs, Clay, and Stateline) and one stream (Big Springs Creek) inhabited by this species in Snake Valley. Flow reductions could eliminate or reduce habitat for this species in Nevada. Population effects could range from decreased numbers to a total loss of the population at a particular spring depending on the magnitude of flow reduction. Loss of one or more of these populations would represent a risk to the species viability due to its limited occurrence to these five locations in Snake Valley.
- Butterfield Pyrg – Flows could be reduced in Butterfield Spring in White River Valley, as indicated by simulated flow reductions of 1 to 18 percent. Habitat loss could reduce the population numbers for the only population in Nevada.
- Flag Pyrg – Flow reductions could adversely affect habitat and population numbers at one spring (Flag) in White River Valley. The simulated flow reduction was predicted to be 1 to 17 percent for the three model time frames. Habitat loss could reduce the population numbers for the only population in Nevada.
- Hardy Pyrg – Pumping could decrease flows in Butterfield Spring in White River Valley, as indicated by the simulated flow reductions of 1 to 18 percent. Flow reductions would decrease habitat, which could result in decreased population numbers for this species. Hardy pyrg is known to occur at seven springs in Cave and White River valleys.
- Lake Valley Pyrg – Flow reductions could decrease habitat for this species in one spring in Lake Valley, Wambolt Spring. The model analysis indicated potential flow reduction at full build out plus 200 years. The effect of habitat reduction could decrease population numbers in the only spring inhabited by this species.

Pumping also could reduce flows in 10 additional springs inhabited by non-petitioned springsnail species (designated as springsnails or Toquerville pyrg). Water levels also could be reduced in Pruess Lake, which contains California floater. It is important to note that water levels in Pruess Lake are controlled by upstream irrigators and therefore, water levels can vary extensively depending on irrigation activity.

Great Basin National Park Pumping Effects

Based on the groundwater drawdown analysis, Proposed Action pumping could reduce flows in two springs and two streams within the GBNP that contain game fish or nongame native fish species. The water resources analysis indicates that Rowland Spring (brook trout) occurs within an area of moderate risk of effects at full build out plus 200 years time frame. Outhouse Spring (Toquerville pyrg and glossy valvata snail) could have reduced flow and habitat at the full build out plus 75 years and full build out plus 200 years. Of the 2.2-mile-section of Lehman Creek that is located within the GBNP and model analysis area, approximately 0.5 mile could exhibit reduced flows at the full build out plus 200 years time frame. Of the 1.8-mile-section of Snake Creek in the GBNP and model analysis area, the entire 1.8 miles could have reduced flows at the full build out plus 75-year and 200-year time frames. As discussed in Section 3.3, Water Resources, a study by Elliott et al. (2006) indicated that other streams at risk include Shingle and Williams Canyon creeks in Spring Valley and Baker and Strawberry creeks in Snake Valley.

Utah Pumping Effects

In Utah, Proposed Action pumping could potentially affect two springs (Clay Spring and Stateline Springs) and two perennial streams (Lake Creek and Snake Creek) in Snake Valley. The analysis predicted that these waterbodies could

be affected at full build out plus 75 years and full build out plus 200 years time frames. The following stream lengths in Utah were estimated to be affected by Proposed Action pumping for these model time frames: Snake Creek (1.2 miles) and Lake Creek (10.6 miles). Game fish and special status aquatic species associated with these waterbodies are listed in **Appendix F**, **Tables F3.7-11** and **F3.7-12**. Pumping effects on northern leopard frog, least chub, and sub-globose pyrg in Foote Reservoir Springs are unlikely, based on the flow prediction analysis. As discussed in Section 3.3, Water Resources, pumping effects to aquatic habitats in Pine, Tule, and Wah Wah valleys are unlikely. It is important to clarify that there is considerable uncertainty regarding the amount of subsurface flow between Snake Valley and Fish Springs Flat. A water balance analysis indicated a potential reduction of 4 to 10 percent in Fish Springs Flat at the 75 and 200 year after full build out time frames. If flows were reduced in Ibis and Pintail ponds in Fish Springs, least chub could be adversely affected by habitat loss. A separate model analysis by Halford and Plume (2011) indicated no effect in Fish Springs (see Section 3.3, Water Resources).

Compliance with Management Objectives

Six species were analyzed in terms of effects of Proposed Action pumping on management objectives (**Appendix F**, **Tables F3.7-8** and **F3.7-9**) for federally listed or conservation agreement species. Results of the analysis are listed below:

- Pahrump Poolfish – As part of the Spring Valley Stipulated Agreement, alternative withdrawal points would be considered for Shoshone Ponds. In addition, mitigation measure GW-WR-4 (drilling a deeper well to provide reliable water for Shoshone ponds) would eliminate pumping effects on Shoshone Ponds and habitat for this species. Therefore, Proposed Action pumping would not affect achievement of recovery plan conservation management objectives for Pahrump poolfish.
- White River Spinedace – Model-simulated percent flow reductions for the Flag Springs complex ranged from 1 to 17 for the 3 model time frames. The 17 percent reduction would conflict with the recovery plan objective of maintaining and enhancing aquatic habitat for White River spinedace at one of its critical habitat locations.
- Bonneville Cutthroat Trout – Flow reductions were predicted for six Bonneville cutthroat trout streams (Pine and Ridge creeks in Spring Valley and Big Wash, Hendry's, Snake, and Strawberry creeks in Snake Valley). Proposed Action pumping also could reduce flows in reintroduction sites in Silver and Snake creeks. Since Big Wash is considered one of the 14 conservation populations in Nevada (**Figure 3.7-7**), Proposed Action pumping would conflict with conservation management objectives for this species.
- Least Chub – Within the model anlaysis area, pumping effects on least chub are unlikely. Since there is a low risk of potential effects on least chub habitat in Fish Springs Flat and Foote Reservoir, conflict with the conservation agreement for this species is unlikely. The conservation agreement management objective specifies that the hydrological features of springs supporting least chub should be maintained. An ACM would be followed, which indicates that SNWA would comply with the conservation agreement for this species.
- Northern Leopard Frog – Flow reductions in 10 springs inhabited by northern leopard frog would conflict with the conservation management objective of protecting known or potential breeding sites for this species.
- Columbia Spotted Frog – Proposed Action pumping was not predicted to adversely affect habitat for Columbia spotted frog within the model analysis area. ACM C.1.49 also indicated that SNWA would comply with the conservation agreement for this species.

Flow or water level reductions also would conflict with management objectives for springs and spring brooks, as defined in the Wildlife Action Plan Team (2006) (**Appendix F**, **Table F3.7-10**).

The COM Plan would be developed and implemented to monitor and mitigate the effects of pumping on aquatic resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation recommended in this EIS. The ACMs, Stipulated Agreements, and monitoring and mitigation recommendations that are part of the COM Plan are described below.

Applicant-committed Measures

As discussed in the Chapter 3, Affected Environment and Environmental Consequences, Introduction, ACMs would be implemented to reduce groundwater pumping impacts on environmental resources. The measures would involve monitoring, management, and mitigation measures required by existing agreements and adaptive management measures. The following items highlight those measures relative to aquatic biological resources. The ACM number from **Appendix E** is noted in parentheses.

Stipulated Agreements

These agreements follow an adaptive management framework such that changes to the monitoring program can occur based on new information and improved understanding of the groundwater-influenced ecosystems. Some potential mitigation and management options have been identified and the appropriate ones would be implemented based on the monitoring results. Thresholds for management action/response have not been identified, but this task would be initiated through the technical work groups. It will be important to link monitoring to appropriate management responses and mitigation to reduce or minimize adverse effects.

- Implement the Spring Valley Hydrologic Monitoring and Mitigation Plan (Hydrologic Area 184) (SNWA 2009b) and Biological Monitoring Plan for the Spring Valley Stipulation (Biological Work Group 2009).
- Implement monitoring, management, and mitigation in Spring, Hamlin, and Snake valleys as required by the Spring Valley Stipulation (ACM C.1.1). Specifically, biological monitoring will be conducted in Spring Valley (Keegan, Minerva Complex, Shoshone Ponds, South Millick, Stonehouse Complex, Swallow, West Spring Valley Complex, Willard, Willow, 4WD Spring, unnamed spring #5) and Snake Valley (Big Springs Complex, Clay, North Little, and unnamed spring #1 north of Big Spring) (Biological Work Group 2009).
- Consider alternative withdrawal points from Shoshone Ponds as part of the Spring Valley Stipulated Agreement (ACM C.1.3).
- Ensure continued monitoring of Flag, Hot Spring, Moorman, Ash, Hiko, and Crystal springs as part of the Dry Lake, Delamar, Cave valleys Stipulation (ACM C.1.38).
- Monitor the biology of valley floor and range-front springs where special status species occur (with approved access) as part of the Dry Lake, Delamar, Cave valleys Stipulation (ACM C.1.42).
- Monitor selected sites for special status species and their habitat in Pahranagat Valley (Ash, Crystal, and Hiko springs) and White River Valley (Hot Creek, Flag, Moorman, and Hardy springs), as determined by the Biological Resource Team and Technical Review Panel (Dry Lake, Delamar, Cave valleys Stipulation) (ACM C.1.42).
- Implement the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (SNWA 2009c) and the Biological Monitoring Plan for the Dry Lake, Delamar, Cave valleys Stipulation (Biological Resource Team 2011).

Other Agreements

- The SNWA assists in the implementation of the Conservation Agreements for the least chub and Columbia spotted frog (ACMs C.1.48 and C.1.49). SNWA is a signatory to these agreements.

Applicant-committed Adaptive Management Measures

These measures to restore and enhance habitat for federally listed species would be implemented in cooperation with the Department of Interior agencies and the NDOW and UDWR.

- Reduce or cease groundwater withdrawals. Reduction or cessation of pumping would be determined on a case-by-case basis for individual production wells or well fields using technical and consultation processes identified in the stipulated agreements (ACM C.2.1).
- Conduct habitat enhancement for springsnails in Snake Valley by restoring natural fluvial morphology of spring flow systems (ACM C.2.6).

- Work with NDOW at the Flag Springs Complex in White River Valley to restore/enhance habitat for the White River spinedace, ensure long-term conservation for the species, and develop water management procedures that would optimize wetland conditions (ACM C.2.8).
- Work with the NDOW and private landowners in areas located at and downstream of Hiko, Crystal, and Ash springs to restore and remove non-native species to benefit Hiko White River springfish, White River springfish, and Pahranagat roundtail chub (ACM C.2.9).
- Work with the irrigation district in Pahranagat Valley to develop system efficiencies and manage water releases to benefit native fish (ACM C.2.10).
- Assist the BLM with habitat enhancement projects in Rainbow Canyon of Lower Meadow Valley Wash to improve conditions for White River speckled dace, southwestern willow flycatchers, and yellow-billed cuckoo (ACM C.2.14).
- Purchase property or obtain conservation easements on private lands in Snake Valley to reduce grazing impacts on springsnail habitat (ACM C.2.16).
- Purchase property or water rights to preserve or enhance habitat for White River spinedace (ACM C.2.17).
- Reduce or change grazing in wet meadows to improve habitat for northern leopard frog (ACM C.2.18).
- Conduct facilitated recharge projects to offset local groundwater drawdown to benefit sensitive biological areas (ACM C.2.21).

Monitoring Recommendations

GW-MN-AB-1: Stream Flow and Aquatic Biology Monitoring. Monitor flows in game fish streams with moderate and high risks where potential pumping effects could occur. See **Appendix F**, **Table F3.7-12** for a list of these streams for the Proposed Action. Monitoring measurements would include discharge and cross-sectional profiles. Cross-section data would be used to estimate flow changes on the wetted area of streams. Fish and macroinvertebrate surveys also would be conducted following methods approved by the DOI agencies and the NDOW.

Game fish streams to be monitored would include 1 stream in Lake Valley, 7 streams in Snake Valley, and 19 streams in Spring Valley (#184) (**Appendix F**, **Table F3.7-12**). Streams located on public lands are listed in **Table 3.3.2-9** in Water Resources. Effectiveness: This measure would be effective in providing baseline and post-project stream flows prior to and during groundwater pumping. Effects on other resources: Implementation of this measure could involve surface disturbance and operational pumping effects on resources, if alternative diversion points are developed.

GW-MN-AB-2: Spring and Aquatic Biology Monitoring. Monitor flows in moderate and high risk springs with game fish or special status species where potential pumping effects could occur. See Appendix **Table F3.7-11** for a list of these springs for the Proposed Action. Cross-sectional profile measurements would be taken in the springs. Biology surveys (fish, macroinvertebrates, springsnails, and amphibians) would follow methods described in the Spring Valley Stipulated Agreement. If monitoring indicates pumping effects, alternative diversion points would be considered.

Monitoring would be conducted at the following springs where pumping effects are predicted (Butterfield in White River Valley; Blind, Cleveland Ranch, North Millick, and Osborne in Spring Valley; Caine in Snake Valley; and Wambolt in Lake Valley). These springs contain special status aquatic species and would be in addition to springs being monitored as part of the Spring Valley and Delamar, Dry Lake, and Cave Valleys Stipulated Agreements (Keegan, Minerva, Shoshone Ponds, South Millick, Stonehouse, Swallow, West Spring Valley Complex, Willow, and unnamed spring #5 in Spring Valley; Big Springs, Clay, North Little, and unnamed spring #1 north of Big Springs in Snake Valley; Ash, Crystal, and Hiko springs in Pahranagat Valley; and Hot Creek, Flag, Moorman, and Hardy springs in White River Valley). Springs located on public lands are listed in **Table 3.3.2-9** in Water Resources. Effectiveness: This measure would be effective in identifying pumping effects on these springs. Effects on other resources: Implementation of this measure could involve surface disturbance and operational pumping effects on resources, if alternative diversion points are developed.

GW-MN-AB-3: Flow/habitat Determination. Flow- or water level-habitat relationships would be studied in selected streams and springs to determine minimum flow or water levels needed to support critical life stage of aquatic species

in these habitats. The streams or springs would be selected from the list being monitored as part of the Stipulated Agreements or additional waterbodies recommended for Measures GWD-MN-AB-1 and GWD-MN-AB-2. Methods for determining minimum flows in stream habitats would be based on existing procedures involving flow-habitat measurements and flow preferences for fish species. It is anticipated that methods would need to be developed for spring habitats due to a general lack of studies. Effectiveness: This measure would be effective in determining flow-habitat relationships. Effects on other resources: This measure would not affect other resources.

A comprehensive monitoring, mitigation, and management plan would be developed for Snake Valley by the BLM in conjunction with the SNWA, other federal agencies, and the states of Utah and Nevada (**Appendix B**). Key concepts of the proposed Snake Valley 3M Plan are described in the monitoring and mitigation recommendations section in Section 3.3, Water Resources, Section 3.5, Vegetation Resources, and Section 3.6, Terrestrial Wildlife. The plan will include actions to manage or mitigate effects, such as geographic redistribution of groundwater withdrawals; reduction or cessation of groundwater withdrawals; acquisition of property or water rights for management of special status species; and augmentation of water supply or acquisition of exiting water rights. The establishment of technical working groups and baseline biological monitoring is also anticipated to be part of this plan. Biological monitoring could include population level studies for sensitive species or other surrogate species at representative locations. A Technical Work Group would be formed and they would determine through the Nature Conservancy's Conservation Action Planning process, if biological monitoring would be needed in Utah basins adjacent to Snake Valley.

Mitigation Recommendations

GW-AB-3: Flow Change Mitigation. The BLM would identify specific mitigation measures during subsequent NEPA for those springs or streams with game fish or special status aquatic species where flow or water level changes are identified during modeling or monitoring. Mitigation ideas are identified as part of ACMs under adaptive management (**Appendix E**). Mitigation options are identified in the COM Plan, ACMs under adaptive management, and water resource measure GW-WR-7. Effectiveness: This measure could be effective in reducing pumping effects on aquatic habitat, if impacts are avoided or offset by mitigation. The effectiveness would depend upon the additional mitigation that would be defined as part of the COM Plan and adaptive management. Without defining the actions to be implemented under this measure, it is not possible to describe effects of any actions on environmental resources.

As described in Section 3.3, Water Resources, mitigation measure **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies (see water resource monitoring measure GW-WR-3a) (see Water Resources, Section 3.3, for a complete wording of GW-WR-3a and GW-WR-7). If monitoring indicates that impacts are occurring or likely will occur in the future and are likely to cause or contribute to unnecessary or undue degradation to federal water resources and water rights, the BLM would determine if emergency action or a mitigation plan is required. The emergency action would involve the BLM issuing a "Cease and Desist" order to prevent additional impact and implementation of mitigation to alleviate impacts. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on water resources. These measures also would assist in protecting water-dependent resources such as aquatic species and their habitat. The specific mitigation measures may include but are not limited to the following:

- Reduction or cessation in groundwater withdrawals;
- Geographic redistribution of groundwater withdrawals;
- Recharge projects to offset local groundwater drawdown;
- Flow augmentation to maintain flow in specific water sources; or
- Other on-site or off-site improvements.

Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As discussed in Section 3.3, Water Resources, Mitigation Measure GW-WR-5 would involve drilling a deeper well that would provide a reliable water source for Shoshone Ponds. The well would be drilled to a depth that would not be

affected by pumping. Implementation of this measure would require surface disturbance at the well site, which would require erosion control measures to reduce sediment input to the ponds.

Mitigation planning could be developed as part of the Snake Valley 3M Plan (**Appendix B**). Management actions included in the Snake Valley 3M Plan that will be considered will include geographic redistribution of groundwater withdrawals; reduction or cessation of groundwater withdrawals; provision of consumptive water supply requirements using surface and/or groundwater sources; acquisition of property or water rights dedicated to management of special status species; and augmentation of water supply and/or acquisition of existing water rights.

Potential residual impacts include:

As discussed in Section 3.3, Water Resources, groundwater drawdown effects are predicted to extend for at least full build out plus 200 years. These potential effects on aquatic habitats including springs, ponds, lakes, and streams could occur during this time frame. Successful implementation of the COM Plan, ACMs, and monitoring and mitigation recommendations would likely reduce effects on aquatic habitat and their associated species at some locations. However, it is not possible to determine the level of impact reduction at this time. Effects on some aquatic habitats and species could exist considering the potential long recovery period that could occur in some aquatic habitats. Therefore, unavoidable impacts on aquatic habitat and species could occur at some locations.

A summary of impact information including ACMs and mitigation recommendations is provided for the Proposed Action in **Table 3.7-7**. This same tabular presentation is used in subsequent pumping effects analyses for Alternatives A through F and No Action.

Table 3.7-7 Summary of Aquatic Biological Resource Impacts, Applicant-committed Protection Measures, and Monitoring and Mitigation Recommendations for Proposed Action Pumping

Effects/Conclusions

- Flow reductions would modify habitat by decreasing depths, water velocities, and wetted area in spring/pond/lake and stream habitats. A total of 30 springs/ponds/lakes and 33 streams are at risk when considering the longest model time frame.
- Effects would be most pronounced in riffle habitats in streams and spring inflow and outflow areas. Effects on pool habitats would depend on the magnitude of the flow change and size of the pools. Reduced flows could adversely affect aquatic habitat by altering thermal regimes, increasing sedimentation, and reducing riparian cover. A complete loss of habitat could occur in small springs and larger springs such as Big Springs in Snake Valley.
- Flow reductions could adversely affect aquatic species by reducing abundance and diversity, altering composition, reducing food sources, limiting spawning and early life stage development, and decreasing individual health condition.
- Flow reductions in nine springs in Spring Valley and one spring in Lake Valley could result in habitat reductions and adverse effects on the special status amphibian, northern leopard frog. Flow reduction in Meadow Valley Wash could adversely affect Arizona toad.
- Flow reductions in Big Springs Creek and Lake Creek in Snake Valley could result in substantial loss of habitat and aquatic species.
- Flow reductions in four springs in Snake Valley could result in loss of bifid duct and longitudinal gland pyrg populations at these locations.
- Substantial flow reductions in Butterfield, Flag, and Wambolt springs could result in the loss of Butterfield, Flag, and Lake Valley pyrg populations due to their limited occurrence (one spring/one basin).
- Conflicts with recovery or conservation management objectives could occur for four species: Pahrump poolfish (Shoshone Ponds), White River spinedace (Flag Springs), Bonneville cutthroat trout (2 streams in Spring Valley and 4 streams in Snake Valley), and northern leopard frog (10 springs).
- Game fish species considered to be traditional values to regional Tribes could be affected in Snake, Spring, Lake, and Lower Meadow Valley Wash.

Impact Indicators[1] By Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Hydrologic Basins at Risk with Waterbodies Containing Game Fish or Special Status Species	1	3	6

Table 3.7-7 Summary of Aquatic Biological Resource Impacts, Applicant-committed Protection Measures, and Monitoring and Mitigation Recommendations for Proposed Action Pumping (Continued)

Impact Indicators[1] By Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Estimated Percent Flow Reductions			
Butterfield Spring (White River Valley)	1	7	18
Flag Springs (White River Valley)	1	7	17
Keegan Spring (Spring Valley)	58	100	100
North Millick Spring (Spring Valley)	31	62	75
South Millick Spring (Spring Valley)	55	94	99
Big Springs (Snake Valley)	2	100	100
Federally Listed Species at Risk			
Pahrump poolfish	Unlikely effect	Potential effect	Potential effect
White River spinedace and critical habitat	Unlikely effect	Potential effect	Potential effect
Hiko White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
Pahranagat roundtail chub	Unlikely effect	Unlikely effect	Unlikely effect
Big Springs spinedace and critical habitat	No effect	No effect	No effect
Moapa dace	No effect	No effect	Unlikely effect
Number of Springs/Ponds/Lakes with Game or Special Status Fish Species at Risk	1	9	11
Number of Springs/Ponds/Lakes with Special Status Amphibian Species at Risk	3	9	10
Number of Springs/Ponds/Lakes with Special Status Invertebrate Species at Risk	0	7	8
Number of Small Springs (100 gpm) with Aquatic Species at Risk	0	13	15
Number of Streams with Game Fish or Special Status Species at Risk	4	25	31
Miles of Streams at Risk with Game Fish or Special Status Species	6	60	75
GBNP Springs and Streams[2] with Game Fish or Special Status Species at Risk			
Outhouse Spring	Unlikely effect	Potential effect	Potential effect
Rowland Spring	Unlikely effect	Unlikely effect	Potential effect
Lehman Creek	Unlikely effect	Unlikely effect	0.5 mile
Snake Creek	Unlikely effect	1.8 miles	1.9 miles
Utah Springs and Streams with Game Fish or Special Status Species at Risk			
Caine Spring	Unlikely effect	Potential effect	Potential effect
Clay Spring	Unlikely effect	Potential effect	Potential effect
Stateline Spring	Unlikely effect	Potential effect	Potential effect
Lake Creek	Unlikely effect	10.6 miles	10.6 miles
Snake Creek	Unlikely effect	1.2 miles	1.2 miles
COM Plan			
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and monitoring and mitigation recommendations.			

Table 3.7-7 Summary of Aquatic Biological Resource Impacts, Applicant-committed Protection Measures, and Monitoring and Mitigation Recommendations for Proposed Action Pumping (Continued)

ACMs
• Existing agreements include the Spring Valley Stipulation, Dry Lake, Delamar, Cave valleys Stipulation, Conservation Agreements (least chub and Columbia spotted frog), Utah and SNWA Snake Valley Environmental Monitoring and Management Agreement (not yet completed), and Candidate Conservation Agreement/Candidate Conservation Agreement with Assurances (not yet completed). • The Spring Valley and Dry Lake, Delamar, Cave valleys Stipulated Agreements will involve monitoring in selected springs in Spring, Snake, Delamar, Dry Lake, and Cave valleys (see Measures C.1.1 and C.1.42 in **Appendix E**). The Spring Valley Stipulated Agreement also would consider alternative withdrawal points from Shoshone Ponds. • Actions will be implemented as part of the Spring Valley and Dry Lake, Delamar, Cave valleys Stipulated Agreements to mitigate unreasonable adverse impacts to special status species (ACM C.2.1). Specific measures related to the mitigation will be developed as part of the monitoring and mitigation planning process. This process would extend into subsequent NEPA analyses for individual basins. • ACMs would be implemented to restore and enhance habitat for federally listed or special status species and would be done in cooperation with the USFWS. These measures would restore or enhance habitat for springsnails (ACM C.2.6 and C.2.16), White River spinedace (ACM C.2.8 and C.2.17), White River springfish (ACM C.2.9), Hiko White River springfish (ACM C.2.9), Pahranagat roundtail chub (ACM C.2.9), White River speckled dace (ACM C.2.14), and northern leopard frog (ACMC.2.18).
Monitoring Recommendations
GW-MN-AB-1 (Stream Flow and Aquatic Biology Monitoring) and **GW-MN-AB-2 (Spring and Aquatic Biology Monitoring)** would be applied to the Proposed Action. Springs and streams to be considered for monitoring are provided in **Appendix F3.7**, **Tables F3.7-11** and **F3.7-12**. Streams and springs located on public lands are listed in **Table 3.3.2-9** in Water Resources. **GW-MN-AB-3 (Flow/Habitat Determination)** would be conducted in selected springs and streams to be able to determine minimum flows or water levels for critical life stages of representative fish species. As described in Water Resources Section 3.3.2, GW-WR-3a (Comprehensive Water Resources Monitoring Plan) would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (See Water Resources, Section 3.3, for complete wording of GW-WR-3a).
Mitigation Recommendations
GW-AB-3 (Flow Change Mitigation) would be applied to the Proposed Action. As described in Water Resources Section 3.3.2, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7). **GW-WR-5 (Shoshone Ponds Mitigation)** would avoid a conflict with management objectives for Pahrump poolfish (see Water Resources, Section 3.3, for complete wording of GW-RW-5).
Potential Residual Impacts
The COM Plan, ACMs, and monitoring and mitigation measures could be effective in reducing impacts to aquatic habitats and species. The objectives of the COM Plan are to avoid impacts to listed species and critical habitat and avoid, minimize, or mitigate adverse impacts to fish. However, it is not possible to determine the level of impact reduction at this time. Effects on some aquatic habitats and species could exist considering the potential long recovery period that could occur in some aquatic habitats. Some unavoidable impacts on aquatic habitat and species could occur at some locations.

[1] Parameters are based on streams or springs that are located within the 10-foot drawdown contour and characterized as having moderate or high risk of pumping effects.

[2] A study by Elliott et al. (2006) indicated that other streams at risk include Shingle and Williams Canyon creeks in Spring Valley and Baker and Strawberry creeks in Snake Valley.

3.7.2.10 Alternative A

Groundwater Development Area

Surface disturbance would be dispersed throughout the five groundwater development basins (Snake, Spring, Delamar, Dry Lake, and Cave). The effects of constructing well pads, gathering pipelines, and electrical service lines would depend upon the location of the facilities in relation to aquatic biological resources. In total, 17 perennial streams and 5 springs with aquatic biological resources occur in the groundwater development areas. A more detailed account of the resource information includes:

- Game Fish – Species occur in 2 streams in Snake Valley and 13 streams in Spring Valley (**Table 3.7-1**; **Figure 3.7-3**).
- Special Status Fish – Bonneville cutthroat trout occurs in one stream (Big Wash in Snake Valley) (**Figure 3.7-3**).
- Special Status Amphibians – Northern leopard frog occurs in three springs (Blind, North Millick, and South Millick in Spring Valley) within the groundwater development areas (**Figure 3.7-4**).
- Springsnails – Toquerville pyrg (not a special status species) occurs in two springs within the groundwater development areas (unnamed spring southwest of Caine Spring in Snake Valley and unnamed spring near Cleve Creek in Spring Valley) (**Figure 3.7-4**).
- Macroinvertebrates – Species are present in all 17 perennial streams and 5 springs and waterbodies with seasonal water presence in the groundwater development area.

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-8** along with ACMs and proposed mitigation.

Table 3.7-8 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative A Groundwater Development

Effects
• Construction could alter aquatic habitat on a short-term basis in 17 perennial streams and 5 springs with aquatic biological resources. Riparian vegetation near waterbodies could be affected on a long-term basis. Surface disturbance and vehicle/equipment could affect water quality from sediment input and risks from fuel spills on a short-term basis. • Instream activities in the spring or fall could affect trout spawning on a short-term basis. • Vehicle traffic near waterbodies could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods. • Special status Bonneville cutthroat trout could be affected in one stream within the groundwater development areas (Big Wash in Snake Valley). • Special status amphibian species (northern leopard frog) could be affected in three springs within the groundwater development areas. • Springsnail species could be affected in spring habitats within two of the groundwater development areas (one unnamed spring in Spring Valley and one spring in Snake Valley). • Conflicts with conservation management objectives could occur for two species: Bonneville cutthroat trout (Big Wash) and northern leopard frog (three springs). • Game fish species considered to be traditional values to regional Tribes could be affected in Snake and Spring valleys.
COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and mitigation recommendations.
BLM RMP Direction and ACMs
• BLM RMP direction for development near springs specifies that surface water resources and associated riparian areas be maintained. • ACM B.1.1 and ACM B.1.3 will consider the presence of special status species and their habitat in the location of production wells, collector lines, and secondary substations. • ACM B.2.1 through B.2.3 will implement permit requirements on well drilling, abandonment, drilling, and water discharge.

Table 3.7-8 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative A Groundwater Development (Continued)

Proposed Mitigation
GW-AB-1 (avoidance of springs and wetlands with special status aquatic species) and **GW-AB-2 (establishing a 0.5-mile buffer near perennial streams with game fish and special status aquatic species)**, as deseribed for the Proposed Aetion, would be applied to Alternative A.
Conclusions
• By avoiding springs and streams with game fish or speeial status speeies, short-term disturbanee would be limited to waterbodies with seasonal flow or limited water volumes. Maeroinvertebrates likely would be present in these waterbodies. • Vehiele traffie eould eause mortalities to amphibians during movement periods espeeially during the spring and summer breeding periods.
Potential Residual Impacts
• Potential amphibian mortalities from vehiele traffie near temporary and permanent waterbodies during eonstruetion.

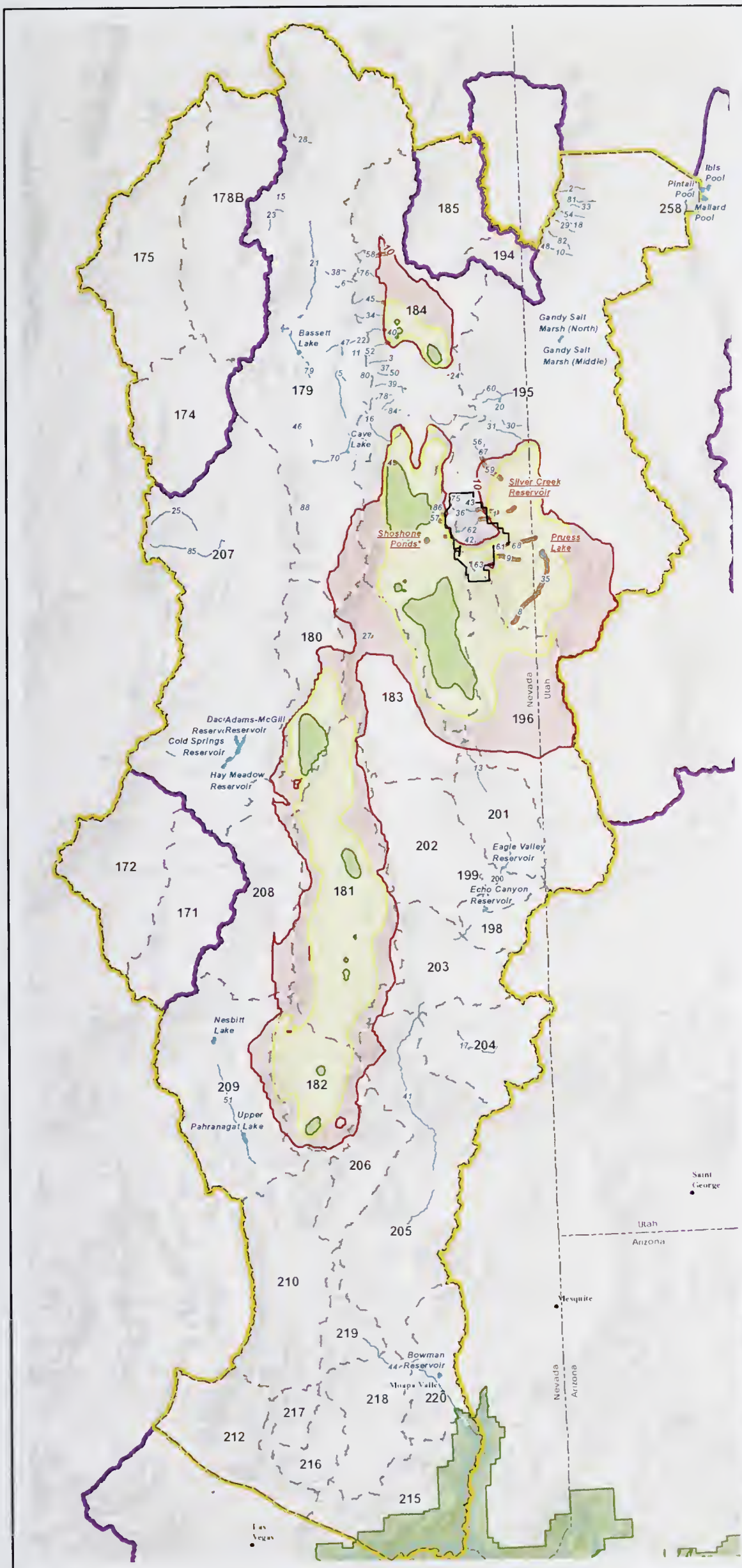
Groundwater Pumping

Alternative A would consist of reduced quantity pumping (114,755 afy) at distributed locations in Snake, Spring, and Delamar, Dry Lake, and Cave valleys. Alternative A pumping could result in reductions in aquatic habitat and affect aquatic species. Based on the model analysis, the predicted 10-foot drawdown contour for Alternative A pumping is shown for streams in **Figure 3.7-9** and springs in **Figure 3.7-10**. Flows could be reduced in the following number of habitats with aquatic biological resources for the three model time frames.

- Streams – 2 at full build out, 14 at full build out plus 75 years, and 19 at full build out plus 200 years; and
- Springs/Ponds/Lakes – 3 at full build out, 19 at full build out plus 75 years, and 28 at full build out plus 200 years.

Flow reductions could affect all types of aquatic communities including fish, amphibians, macroinvertebrates, macrophytes, and algae. For this EIS analysis, emphasis was placed on game fish and special status aquatic species. Alternative A could adversely affect the following game fish or special status species and their associated waterbody occurrences in at least one of the model time frames. Specific results for waterbodies and species at risk for each model time frame are provided in **Appendix F**, **Tables F3.7-14** and **F3.7-15**.

- Game Fish Streams – Geyser Creek in Lake Valley; Baker, Big Wash, Lake, Lehman, Silver, and Snake creeks in Snake Valley; Bastian, Indian, Meadow, Muncy, Piermont, Pine, Ridge, Shingle, Siegel, Willard, and Williams Canyon creeks in Spring Valley.
- Game Fish Springs/Ponds/Lakes – Swallow Spring in Spring Valley; Pruess Lake, Rowland Spring, and Silver Creek Reservoir in Snake Valley.
- Federally Listed Species – White River spinedace and critical habitat in Flag Springs (White River Valley) and Pahrump poolfish in Shoshone Ponds (Spring Valley).
- Bonneville Cutthroat Trout – Stream miles at risk for flow reductions include: Pine (0.1 to 0.4 mile or 12 to 50 percent of occupied habitat in this stream), Ridge (0.6 to 1.1 miles or 50 to 92 percent of occupied habitat in this stream), Big Wash (4.8 miles or 100 percent of occupied habitat in this stream), and Snake (<0.1 mile or <1 percent of occupied habitat in this stream).
- Other Special Status Fish Streams – Baker, Big Wash, and Snake creeks in Snake Valley and Ridge Creek in Spring Valley.
- Other Special Status Fish Springs/Ponds/Lakes – Butterfield and Flag springs in White River Valley; Keegan, and Shoshone Ponds in Spring Valley; and Big Springs and Stateline Springs in Snake Valley.



#	Stream Name	#	Stream Name
1	Baker Creek	46	Murry Creek
2	Basin Creek	47	North Creek
3	Bassett Creek	48	North Fork of Birch Creek
4	Bastian Creek	49	North Fork Snake Creek
5	Berry Creek	50	Odgers Creek
6	Big Indian Creek	51	Pahranagat Creek
7	Big Negro Creek	52	Piermont Creek
8	Big Springs Creek	53	Pine Creek
9	Big Wash	54	Red Cedar Creek
10	Birch Creek	55	Ridge Creek
11	Bird Creek	56	Second Fork Silver Creek
12	Board Creek	57	Shingle Creek
13	Camp Valley Creek	58	Siegel Creek
14	Cave Creek	59	Silver Creek
15	Cherry Creek	60	Smith Creek
16	Cleve Creek	61	Snake Creek
17	Clover Creek	62	South Fork Baker Creek
18	Cottonwood Creek	63	South Fork Big Wash
19	Deadman Creek	64	South Fork Snake Creek
20	Deep Canyon Creek	65	South Fork Willard Creek
21	Duck Creek	66	South Taft Creek
22	East Creek	67	Spring Creek (Tributary to Silver Creek)
23	Egan Creek	68	Spring Creek (Tributary to Snake Creek)
24	Eightmile Creek	69	Spring Valley Creek
25	Ellison Creek	70	Steptoe Creek
26	Forest Home Creek	71	Steptoe Ranch Stream 3
27	Geyser Creek	72	Steptoe Ranch Stream 4a
28	Goshute Creek	73	Steptoe Ranch Stream 4b
29	Granite Creek	74	Steptoe Ranch Stream 5
30	Hampton Creek	75	Strawberry Creek
31	Hendry's Creek	76	Sunkist (North) Creek
32	Indian Creek	77	Sunnyside Creek
33	Indian Farm Creek	78	Taft Creek
34	Kalamazoo Creek	79	Tailings Creek
35	Lake Creek	80	Timber Creek
36	Lehman Creek	81	Tom's Creek
37	Little Negro Creek	82	Trout Creek
38	Mattier Creek	83	Upper Snake Creek
39	McCoy Creek	84	Vipont Creek
40	Meadow Creek	85	White River
41	Meadow Valley Wash	86	Willard Creek
42	Middle Fork Snake Creek	87	Williams Canyon Creek
43	Mill Creek	88	Willow Creek
44	Muddy River		
45	Muncy Creek		

Underlined streams may be affected where "At Risk" stream segments intersect drawdown.

Potentially Affected "At Risk" Stream Segment

Potentially Affected "At Risk" Waterbody

Legend

Water Features Containing Sensitive Aquatic Biology or Game Fish

- Perennial Stream Reach
- Waterbody
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

* Fed by artesian well

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-9

Alternative A Drawdown and Streams/ Waterbodies with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles

0 5 10 15 20 25 50 75 Kilometers

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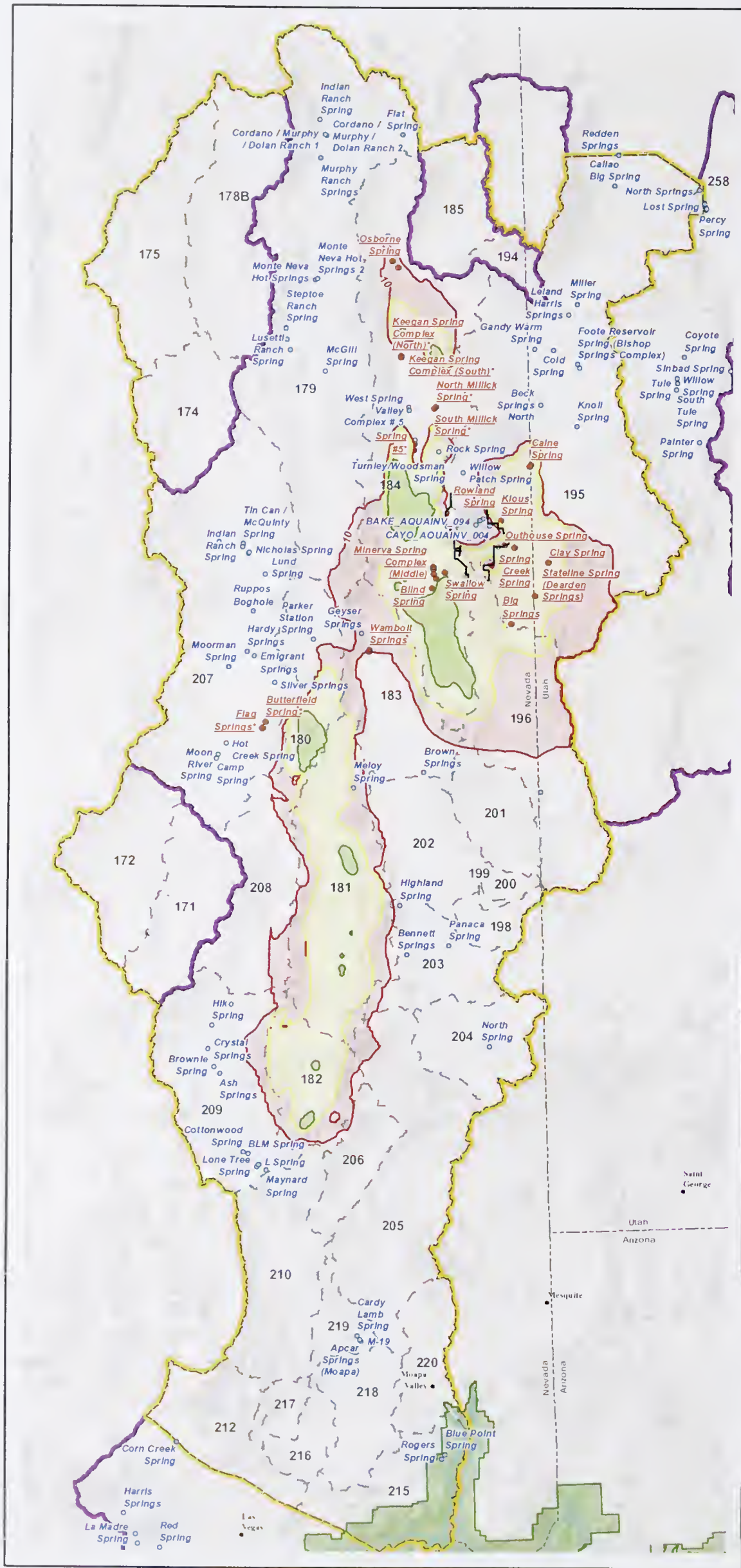
N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data



Legend

- Spring Containing Sensitive Aquatic Biology or Game Fish
- Potentially Affected Spring Containing Sensitive Aquatic Biology or Game Fish
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

*Spring is outside 10-ft drawdown contour, but model-predicted flow reductions indicate potential effect.

Basin #	Basin Name	Basin #	Basin Name
171	Coal Valley	202	Patterson Valley
172	Garden Valley	203	Panaca Valley
174	Jakes Valley	204	Clover Valley
175	Long Valley	205	Lower Meadow Valley Wash
178B	Butte Valley (Southern Part)	206	Kane Springs Valley
179	Steptoe Valley	207	White River Valley
180	Cave Valley	208	Pahroc Valley
181	Dry Lake Valley	209	Pahranagat Valley
182	Delamar Valley	210	Coyote Spring Valley
183	Lake Valley	212	Las Vegas Valley
184	Spring Valley	215	Black Mountain Area
185	Tippett Valley	216	Garnet Valley
194	Pleasant Valley	217	Hidden Valley (North)
195	Snake Valley	218	California Wash
196	Hamlin Valley	219	Muddy River Springs Area
198	Dry Valley	220	Lower Moapa Valley
199	Rose Valley	258	Fish Springs Flat
200	Eagle Valley		
201	Spring Valley		

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-10

Alternative A Drawdown and Springs with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles
0 5 10 15 20 25 50 75 Kilometers
1:2,000,000

N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

- Special Status Amphibian Species Springs/Ponds/Lakes – Blind, Keegan, Minerva, North Millick, South Millick, and unnamed #5 springs and Shoshone Ponds and O'Neal/Frog Pond in Spring Valley and Wambolt Spring in Lake Valley.
- Special Status Invertebrates Springs/Ponds/Lakes – Butterfield and Flag springs in White River Valley; Big Springs, Clay, Stateline Springs, one unnamed spring, and Pruess Lake in Snake Valley; and Wambolt Spring in Lake Valley.

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-9** along with ACMs and proposed mitigation.

Table 3.7-9 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative A Pumping

Effects/Conclusions

- Flow reductions would modify habitat by decreasing depths, water velocities, and wetted area in spring/pond/lake and stream habitats. A total of 28 springs/ponds/lakes and 20 streams are at risk when considering the longest model time frame.
- Effects would be most pronounced in riffle habitats in streams and spring inflow and outflow areas. Effects on pool habitats would depend on the magnitude of the flow change and size of the pools. Reduced flows could adversely affect aquatic habitat by altering thermal regimes, increasing sedimentation, and reducing riparian cover. A complete loss of habitat could occur in small springs and larger springs such as Big Springs in Snake Valley.
- Flow reductions could adversely affect aquatic species by reducing abundance and diversity, altering composition, reducing food sources, limiting spawning and early life stage development, and decreasing individual health condition.
- Flow reductions in 8 springs/ponds in Spring Valley and 1 spring in Lake Valley could result in habitat reductions and adverse effects on the special status amphibian, northern leopard frog.
- Flow reductions in Big Springs Creek and Lake Creek in Snake Valley could result in substantial loss of habitat and aquatic species.
- Flow reductions in 4 springs in Snake Valley could result in loss of bifid duct and longitudinal gland pyrg populations at these locations.
- Due to their limited occurrence (one spring/one basin), populations of Butterfield pyrg (Butterfield Spring), Flag pyrg (Flag Springs), and Lake Valley pyrg (Wambolt Spring) could be lost if their spring habitat is substantially reduced.
- Conflicts with recovery or conservation management objectives could occur for four species: Pahrump poolfish (Shoshone Ponds), White River spinedace (Flag Springs), Bonneville cutthroat trout (2 streams in Spring Valley and 2 streams in Snake Valley), and northern leopard frog (9 springs/ponds).
- Game fish species considered to be traditional values to regional Tribes could be affected in Snake and Spring valleys.

Impact Indicators[1] By Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Hydrologic Basins at Risk with Waterbodies Containing Game Fish or Special Status Species	1	2	4
Estimated Percent Flow Reductions			
Butterfield Spring (White River Valley)	0	3	8
Flag Springs (White River Valley)	1	3	8
Keegan Spring (Spring Valley)	12	28	36
North Millick Spring (Spring Valley)	4	9	11
South Millick Spring (Spring Valley)	10	21	24
Big Springs (Snake Valley)	2	100	100
Federally Listed Species at Risk			
Pahrump poolfish	Unlikely effect	Potential effect	Potential effect
White River spinedace and critical habitat	Unlikely effect	Unlikely effect	Potential effect
Hiko White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
Pahranagat roundtail chub	No effect	No effect	No effect
Big Springs spinedace and critical habitat	No effect	No effect	No effect
Moapa dace	No effect	No effect	No effect

Table 3.7-9 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative A Pumping (Continued)

Impact Indicators[1] By Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs/Ponds/Lakes with Game or Speeial Status Fish Speeies at Risk	2	8	10
Number of Springs/Ponds/Lakes with Speeial Status Amphibian Species at Risk	2	6	9
Number of Springs/Ponds/Lakes with Special Status Invertebrate Species at Risk	0	5	8
Number of Small Springs (100 gpm) with Aquatie Speeies at Risk	0	7	12
Number of Streams with Game Fish or Speeial Status Species at Risk	2	14	19
Miles of Streams at Risk with Game Fish or Special Status Speeies	3	45	58
GBNP Springs and Streams[2] with Game Fish or Special Status Speeies at Risk			
Outhouse Spring	Unlikely effeet	Potential effect	Potential effeet
Rowland Spring	Unlikely effeet	Unlikely effect	Potential effeet
Lehman Creek	Unlikely effeet	Unlikely effect	0.5 mile
Snake Creek	Unlikely effeet	1.8 miles	1.9 miles
Utah Springs and Streams with Game Fish or Speeial Status Species at Risk			
Caine Spring	Unlikely effect	Potential effect	Potential effeet
Clay Spring	Unlikely effeet	Potential effeet	Potential effect
Stateline Spring	Unlikely effeet	Potential effect	Potential effeet
Lake Creek	Unlikely effect	10.6 miles	10.6 miles
Snake Creek	Unlikely effeet	1.2 miles	1.2 miles

COM Plan

- The COM Plan for designing and implementing monitoring and mitigation would integrate proteetive measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatie resourees are summarized below for ACMs and monitoring and mitigation reeommendations.

ACMs

- Existing agreements inelude the Spring Valley Stipulation, Dry Lake, Delamar, Cave valleys Stipulation, Conservation Agreements (least ehub and Columbia spotted frog) Utah and SNWA Snake Valley Environmental Monitoring and Management Agreement with Assuranees (not yet completed), and Candidate Conservation Agreement/Candidate Conservation Agreement with Assurances (not yet eompleted).
- The Spring Valley and Dry Lake, Delamar, Cave valleys Stipulated Agreements will involve monitoring in seleeted springs in Spring, Snake, Delamar, Dry Lake and Cave valleys (see Measures C.1.1 and C.1.42 in **Appendix E**). The Spring Valley Stipulated Agreement also would eonsider alternative withdrawal points from Shoshone Ponds.
- Aetions will be implemented as part of the Spring Valley and Dry Lake, Delamar, Cave valleys Stipulated Agreements to mitigate unreasonable adverse impaets to speeial status species (ACM C.2.1). Specifie measures related to the mitigation will be developed as part of the monitoring and mitigation planning proeess. This process would extend into subsequent NEPA analyses for individual basins.
- ACMs would be implemented to restore and cnhanee habitat for federally listed or speeial status speeies and would be done in cooperation with the USFWS. These measures would restore or enhanee habitat for springsnails (ACM C.2.6 and ACM C.2.16), White River spinedace (ACM C.2.8 and ACM C.2.17), White River springfish (ACM C.2.9), Hiko White River springfish (ACM C.2.9), Pahranagat roundtail chub (ACM C.2.9), White River speekled daee (ACM C.2.14), and northern leopard frog (ACMC.2.18).

Table 3.7-9 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative A Pumping (Continued)

Monitoring Recommendations
GW-MN-AB-1 (Stream Flow and Aquatic Biology Monitoring) and **GW-MN-AB-2** (Spring and Aquatic Biology Monitoring) described for the Proposed Action, would be applied to Alternative A. Springs and streams to be considered for monitoring are provided in **Appendix F3.7**, **Tables F3.7-14** and **F3.7-15**. Streams and springs located on public lands are listed in **Table 3.3.2-9** in Water Resources. **GW-MN-AB-3 (Stream Flow and Aquatic Biology Monitoring)** will be conducted in selected springs and streams to be able to determine minimum flows or water levels for critical life stages of representative fish species. As described in Water Resources, Section 3.3, GW-WR-3a (Comprehensive Water Resources Monitoring Plan) would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).
Mitigation Recommendations
GW-AB-3 (Flow Change Mitigation) described for the Proposed Action, also would be applied to Alternative A. As described in Water Resources, Section 3.3, GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights) would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7). **GW-WR-5 (Shoshone Ponds Mitigation)** would avoid a conflict with management objectives for Pahrump poolfish (see Water Resources, Section 3.3, for complete wording of GW-WR-5).
Potential Residual Impacts
• The COM Plan, ACMs, and monitoring and mitigation measures could be effective in reducing impacts to aquatic habitats and species. The objectives of the COM Plan are to avoid impacts to listed species and critical habitat and avoid, minimize, or mitigate adverse impacts to fish. However, it is not possible to determine the level of impact reduction at this time. Effects on some aquatic habitats and species could exist considering the potential long recovery period that could occur in some aquatic habitats. Some unavoidable impacts on aquatic habitat and species could occur at some locations.

[1] Parameters are based on streams or springs that are located within the 10-foot drawdown contour and characterized as having moderate or high risk of pumping effects.

[2] A study by Elliott et al. (2006) indicated that other streams at risk include Shingle and Williams Canyon creeks in Spring Valley and Baker and Strawberry creeks in Snake Valley.

3.7.2.11 Alternative B

Groundwater Development Area

Surface disturbance would be focused on an approximate 1-mile radius of diversion points in five basins (Snake, Spring, Cave, Dry Lake, and Delamar). The effects of constructing well pads, gathering pipelines, and electrical service lines would depend upon the location of the facilities in relation to aquatic biological resources. In total, one perennial stream (Big Springs Creek in Snake Valley) and one spring (Kious Spring in Snake Valley) with aquatic biological resources occur within a 1-mile radius of diversion points. A more detailed account of the resource information includes:

- Game Fish – No species are present in Big Springs Creek or Kious Spring.
- Native Fish – Native species (mottled sculpin, redside shiner, speckled dace, and Utah chub) that have limited distribution in Nevada occur in Big Springs Creek.
- Special Status Amphibians – No species are present in Big Springs Creek or Kious Spring.
- Springsnails – Springsnails (species not identified) occur in Kious Spring.
- Macroinvertebrates – Species are present in Big Springs Creek, Kious Spring, and waterbodies with seasonal water presence in the groundwater development area.

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-10** along with ACMs and proposed mitigation.

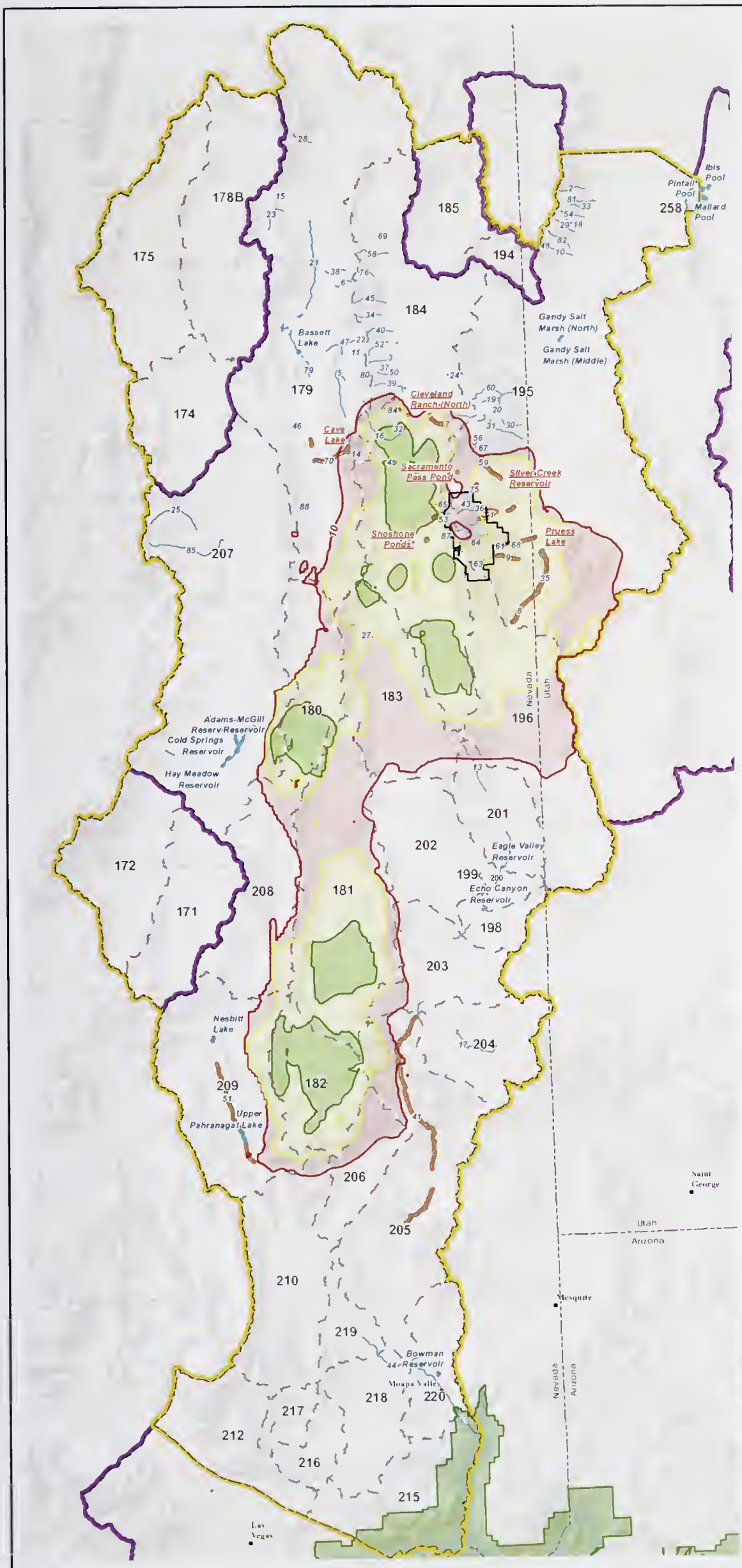
Table 3.7-10 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative B Groundwater Development

Effects
• Construction could alter aquatic habitat on a short-term basis in one perennial stream (Big Springs Creek) and one spring (Kious) in Snake Valley. Riparian vegetation near waterbodies could be affected on a long-term basis. Surface disturbance and vehicle/equipment could affect water quality from sediment input and risks from fuel spills on a short-term basis. • Vehicle traffic near waterbodies could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods. • Springsnail species could be affected in Kious Spring in one of the groundwater development areas in Snake Valley. • There would be no conflicts with management objectives for special status species. • There would be no effects on fish species considered to be traditional values to regional Tribes.
COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and mitigation recommendations.
BLM RMP Direction and ACMs
• The BLM RMP direction for development near springs specifies that surface water resources and associated riparian areas be maintained. • ACMs B.1.1 and B.1.3 will consider the presence of special status species and their habitat in the location of production wells, collector lines, and secondary substations. • ACMs B.2.1 through B.2.3 will implement permit requirements on well drilling, abandonment, drilling, and water discharge.
Proposed Mitigation
GW-AB-1 (Avoidance of springs and wetlands with special status species) and **GW-AB-2 (Establishing a 0.5-mile buffer near perennial streams with game fish and special status species)**, as described for the Proposed Action, would be applied to Alternative B.
Conclusions
• By avoiding springs and streams with game or native fish or special status species, short-term disturbance would be limited to waterbodies with seasonal flow or limited water volumes. Macroinvertebrates likely would be present in these waterbodies. • Vehicle traffic could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods.
Potential Residual Impacts
• Potential amphibian mortalities from vehicle traffic near temporary and permanent waterbodies during construction.

Groundwater Pumping

Alternative B would consist of full quantity pumping (176,655 afy) at or near Points of Diversions in Snake, Spring, and Delamar, Dry Lake, and Cave valleys. Alternative B pumping could result in reductions in aquatic habitat and affect aquatic species. Based on the model analysis, the predicted 10-foot drawdown contour for Alternative B pumping is shown for streams in **Figure 3.7-11** and springs in **Figure 3.7-12**. Flows could be reduced in the following number of habitats with aquatic biological resources for the three model time frames.

- Streams – 3 at full build out, 18 at full build out plus 75 years, and 24 at full build out plus 200 years; and
- Springs/Ponds/Lakes – 8 at full build out, 27 at full build out plus 75 years, and 33 at full build out plus 200 years.



#	Stream Name
1	Baker Creek
2	Basin Creek
3	Bassett Creek
4	Bastian Creek
5	Berry Creek
6	Big Indian Creek
7	Big Negro Creek
8	Big Springs Creek
9	Big Wash
10	Birch Creek
11	Bird Creek
12	Board Creek
13	Camp Valley Creek
14	Cave Creek
15	Cherry Creek
16	Cleve Creek
17	Clover Creek
18	Cottonwood Creek
19	Deadman Creek
20	Deep Canyon Creek
21	Duck Creek
22	East Creek
23	Egan Creek
24	Eightmile Creek
25	Ellison Creek
26	Forest Home Creek
27	Geyser Creek
28	Goshute Creek
29	Granite Creek
30	Hampton Creek
31	Hendry's Creek
32	Indian Creek
33	Indian Farm Creek
34	Kalamazoo Creek
35	Lake Creek
36	Lehman Creek
37	Little Negro Creek
38	Mattier Creek
39	McCoy Creek
40	Meadow Creek
41	Meadow Valley Wash
42	Middle Fork Snake Creek
43	Mill Creek
44	Muddy River
45	Muncy Creek
46	Murry Creek
47	North Creek
48	North Fork of Birch Creek
49	North Fork Snake Creek
50	Odgers Creek
51	Pahranagat Creek
52	Piermont Creek
53	Pine Creek
54	Red Cedar Creek
55	Ridge Creek
56	Second Fork Silver Creek
57	Shingle Creek
58	Siegel Creek
59	Silver Creek
60	Smith Creek
61	Snake Creek
62	South Fork Baker Creek
63	South Fork Big Wash
64	South Fork Snake Creek
65	South Fork Willard Creek
66	South Taft Creek
67	Spring Creek (Tributary to Silver Creek)
68	Spring Creek (Tributary to Snake Creek)
69	Spring Valley Creek
70	Steptoe Creek
71	Steptoe Ranch Stream 3
72	Steptoe Ranch Stream 4a
73	Steptoe Ranch Stream 4b
74	Steptoe Ranch Stream 5
75	Strawberry Creek
76	Sunkist (North) Creek
77	Sunnyside Creek
78	Taft Creek
79	Tailings Creek
80	Timber Creek
81	Tom's Creek
82	Trout Creek
83	Upper Snake Creek
84	Vipont Creek
85	White River
86	Willard Creek
87	Williams Canyon Creek
88	Willow Creek

Underlined streams may be affected where "At Risk" stream segments intersect drawdown.

Potentially Affected "At Risk" Stream Segment

Potentially Affected "At Risk" Waterbody

Legend

Water Features Containing Sensitive Aquatic Biology or Game Fish

- Perennial Stream Reach
- Waterbody
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

* Fed by artesian well

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

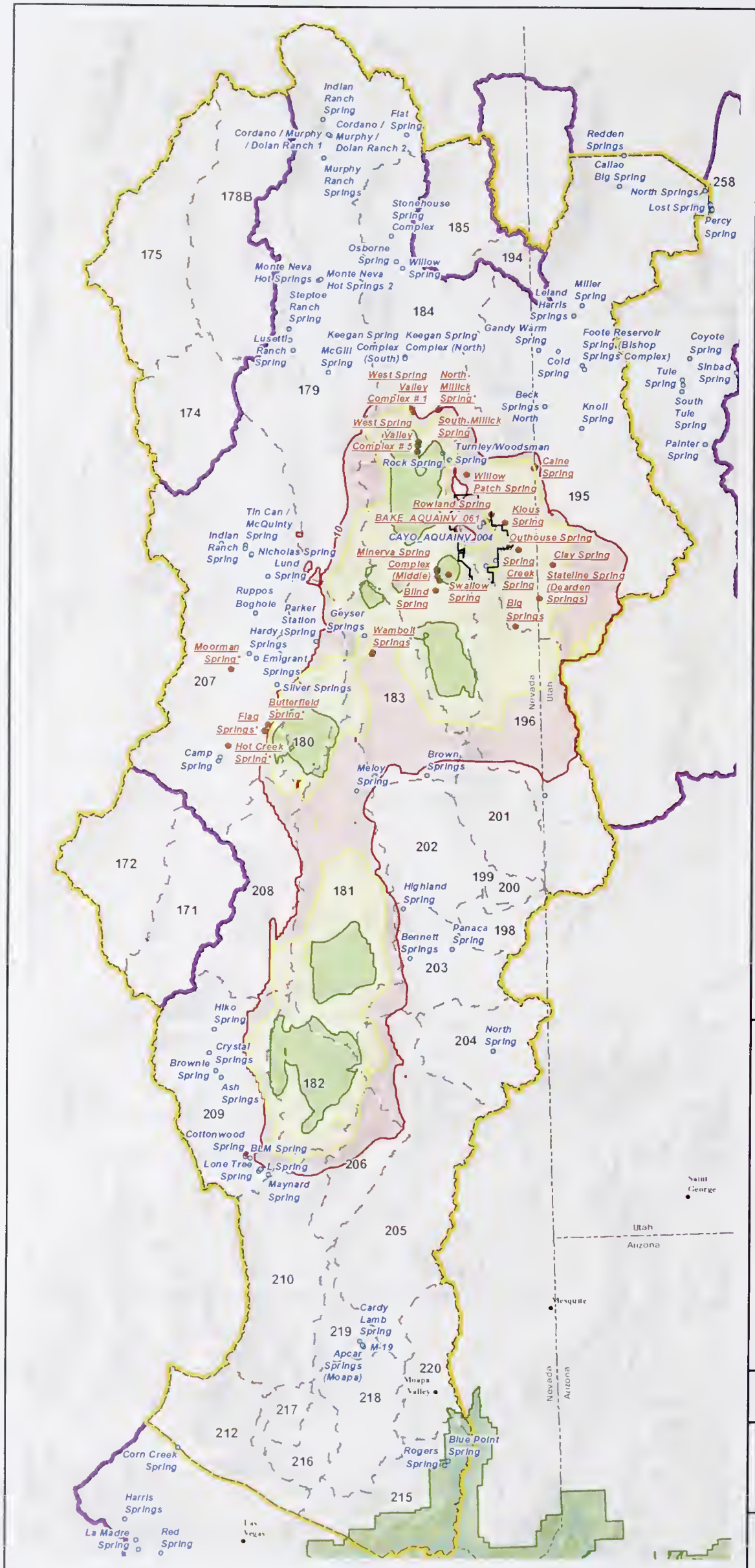
Figure 3.7-11

Alternative B Drawdown and Streams/ Waterbodies with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles
0 5 10 15 20 25 50 75 Kilometers
1:2,000,000

N

No Warranty is made by the Bureau of Land Management as to the accuracy reliability. or completeness of these data for individual use or aggregate use with other data



Legend

- Spring Containing Sensitive Aquatic Biology or Game Fish
- Potentially Affected Spring Containing Sensitive Aquatic Biology or Game Fish
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

*Spring is outside 10-ft drawdown contour, but model-predicted flow reductions indicate potential effect.

Basin #	Basin Name	Basin #	Basin Name
171	Coal Valley	202	Patterson Valley
172	Garden Valley	203	Panaca Valley
174	Jakes Valley	204	Clover Valley
175	Long Valley	205	Lower Meadow Valley Wash
178B	Butte Valley (Southern Part)	206	Kane Springs Valley
179	Steptoe Valley	207	White River Valley
180	Cave Valley	208	Pahroc Valley
181	Dry Lake Valley	209	Pahranagat Valley
182	Delamar Valley	210	Coyote Spring Valley
183	Lake Valley	212	Las Vegas Valley
184	Spring Valley	215	Black Mountain Area
185	Tippett Valley	216	Garnet Valley
194	Pleasant Valley	217	Hidden Valley (North)
195	Snake Valley	218	California Wash
196	Hamlin Valley	219	Muddy River Springs Area
198	Dry Valley	220	Lower Moapa Valley
199	Rose Valley	258	Fish Springs Flat
200	Eagle Valley		
201	Spring Valley		

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-12

Alternative B Drawdown and Springs with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles
0 5 10 15 20 25 50 75 Kilometers
1 2,000,000
N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

Flow reductions could affect all types of aquatic communities including fish, amphibians, macroinvertebrates, macrophytes, and algae. For this EIS analysis, emphasis was placed on game fish and special status aquatic species. Alternative B could adversely affect the following game fish or special status species and their associated waterbody occurrences in at least one of the model time frames. Specific results for waterbodies and species at risk for each model time frames are provided in **Appendix F**, **Tables F3.7-16** and **F3.7-17**.

- Game Fish Streams – Steptoe Creek in Steptoe Valley; Geyser Creek in Lake Valley; Baker, Big Wash, Lake, Lehman, Silver, Snake, and Strawberry creeks in Snake Valley; Bastian, Indian, Negro, Pine, Ridge, Shingle, Taft, South Taft, Vipont, Willard, and Williams Canyon creeks in Spring Valley; and Lower Meadow Valley Wash (stream and basin name).
- Game Fish Springs/Ponds/Lakes – Swallow Spring in Spring Valley; Pruess Lake, Rowland Spring, and Silver Creek Reservoir in Snake Valley; and Cave Lake in Steptoe Valley.
- Federally Listed Species – White River spinedace and critical habitat in Flag Springs (White River Valley) and Pahrump poolfish in Shosone Ponds (Spring Valley).
- Bonneville Cutthroat Trout – Stream miles at risk for flow reductions include: Pine (0.1 to 0.4 mile or 12 to 50 percent of occupied habitat in this stream), Ridge (0.6 to 1.1 miles or 50 to 92 percent of occupied habitat in this stream), Big Wash (4.8 miles or 100 percent of occupied habitat in this stream), Strawberry (1.5 to 1.9 miles or 23 to 30 percent of occupied habitat in this stream), and Snake (<0.1 mile or < 1 percent of occupied habitat in this stream).
- Other Special Status Fish Streams – Baker, Big Wash, Snake, and Strawberry creeks in Snake Valley; Pine and Ridge creeks in Spring Valley; and Meadow Valley Wash (same valley name).
- Other Special Status Fish Springs/Ponds/Lakes – Butterfield, Flag, Hot Creek and Moorman springs in White River Valley; Keegan Spring and Shoshone Ponds in Spring Valley; and Big Springs and Stateline Springs in Snake Valley.
- Special Status Amphibian Species (Northern Leopard Frog) Springs/Ponds/Lakes – Blind, Cleveland Ranch, Keegan, Minerva, North Millick, South Millick, West Valley Complex, and unnamed # 5 springs and Shoshone Ponds in Spring Valley and Wambolt Spring in Lake Valley.
- Special Status Amphibian Species (Arizona Toad) – Lower Meadow Valley Wash.
- Special Status Invertebrates Springs/Ponds/Lakes – Butterfield, Flag, Hot Creek, and Moorman springs in White River Valley; Big Springs, Clay, Stateline, and one unnamed spring and Pruess Lake in Snake Valley; and Wambolt Spring in Lake Valley.

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-11** along with ACMs and proposed mitigation.

Table 3.7-11 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative B Pumping

Effects/Conclusions

- Flow reductions would modify habitat by decreasing depths, water velocities, and wetted area in spring/pond/lake and stream habitats. A total of 32 springs/ponds/lakes and 24 streams are at risk when considering the longest model time frame.
- Effects would be most pronounced in riffle habitats in streams and spring inflow and outflow areas. Effects on pool habitats would depend on the magnitude of the flow change and size of the pools. Reduced flows could adversely affect aquatic habitat by altering thermal regimes, increasing sedimentation, and reducing riparian cover. A complete loss of habitat could occur in small springs and larger springs such as Big Springs in Snake Valley.
- Flow reductions could adversely affect aquatic species by reducing abundance and diversity, altering composition, reducing food sources, limiting spawning and early life stage development, and decreasing individual health condition.
- Flow reductions in 9 springs/ponds in Spring Valley and 1 spring in Lake Valley could result in habitat reductions and adverse effects on the special status amphibian, northern leopard frog. Flow reductions in Lower Meadow Valley Wash could adversely affect Arizona toad.
- Flow reductions in Big Springs Creek and Lake Creek in Snake Valley could result in substantial loss of habitat and aquatic species.
- Flow reductions in 4 springs in Snake Valley could result in loss of bifid duct and longitudinal gland pyrg populations at these locations.
- Due to their limited occurrence (one spring/one basin), populations of Butterfield pyrg (Butterfield Spring) Flag pyrg (Flag Springs), and Lake Valley pyrg (Wambolt Spring) could be lost if their spring habitat is substantially reduced.
- Conflicts with recovery or conservation management objectives could occur for 4 species: Pahrump poolfish (Shoshone Ponds), White River spinedace (Flag Springs), Bonneville cutthroat trout (2 streams in Spring Valley and 3 streams in Snake Valley), and northern leopard frog (10 springs).
- Game fish species considered to be traditional values to regional Tribes could be affected in Snake, Spring, Lake, Steptoe, and Lower Meadow Valley Wash valleys.

Impact Indicators[1] By Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Hydrologic Basins at Risk with Waterbodies Containing Game Fish or Special Status Species	3	4	7
Estimated Percent Flow Reductions			
Butterfield Spring (White River Valley)	20	34	45
Flag Springs (White River Valley)	19	29	37
Hot Creek Spring (White River Valley)	3	5	7
Moorman Spring (White River Valley)	2	4	6
Keegan Spring (Spring Valley)	0	3	5
North Millick Spring (Spring Valley)	2	18	42
South Millick Spring (Spring Valley)	8	47	99
Big Springs (Snake Valley)	7	100	100
Federally Listed Species at Risk			
Pahrump poolfish	Unlikely effect	Potential effect	Potential effect
White River spinedace and critical habitat	Potential effect	Potential effect	Potential effect
Hiko White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
Pahranagat roundtail chub	No effect	No effect	No effect
Big Springs spinedace and critical habitat	No effect	No effect	Unlikely effect
Moapa dace	No effect	No effect	Unlikely effect
Number of Springs/Ponds/Lakes with Game or Special Status Fish Species at Risk	4	10	14
Number of Springs/Ponds/Lakes with Special Status Amphibian Species at Risk	3	8	10
Number of Springs/Ponds/Lakes with Special Status Invertebrate Species at Risk	3	7	10
Number of Small Springs (100 gpm) with Aquatic Species at Risk	2	9	13
Number of Streams with Game Fish or Aquatic Species at Risk	3	18	24

Table 3.7-11 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative B Pumping (Continued)

Impact Indicators[1] By Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Miles of Streams at Risk with Game Fish or Special Status Species	3	59	72
GBNP Springs and Streams[2] with Game Fish or Special Status Species at Risk			
Outhouse Spring	Unlikely effect	Potential effect	Potential effect
Rowland Spring	Unlikely effect	Potential effect	Potential effect
Baker Creek	Unlikely effect	1.2 miles	1.6 miles
Lehman Creek	Unlikely effect	2.0 miles	2.5 miles
Snake Creek	Unlikely effect	1.9 miles	1.9 miles
Utah Springs and Streams with Game Fish or Special Status Species at Risk			
Clay Spring	Unlikely effect	Potential effect	Potential effect
Stateline Spring	Unlikely effect	Potential effect	Potential effect
Lake Creek	Unlikely effect	10.6 miles	10.6 miles
Snake Creek	Unlikely effect	0.6 mile	0.6 mile

COM Plan

- The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional monitoring and mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and monitoring and mitigation recommendations.

ACMs

- Existing agreements include the Spring Valley Stipulation, Dry Lake, Delamar, Cave valleys Stipulation, Conservation Agreements (least chub and Columbia spotted frog) Utah and SNWA Snake Valley Environmental Monitoring and Management Agreement (not yet completed), and Candidate Conservation Agreement/Candidate Conservation Agreement with Assurances (not yet completed).
- The Spring Valley and Dry Lake, Delamar, Cave valleys Stipulated Agreements will involve monitoring in selected springs in Spring, Snake, Delamar, Dry Lake and Cave valleys (see ACMs C.1.1 and C.1.42 in **Appendix E**). The Spring Valley Stipulated Agreement also would consider alternative withdrawal points from Shoshone Ponds.
- Actions will be implemented as part of the Spring Valley and Dry Lake, Delamar, Cave valleys Stipulated Agreements to mitigate unreasonable adverse impacts to special status species (ACM C.2.1). Specific measures related to the mitigation will be developed as part of the monitoring and mitigation planning process. This process would extend into subsequent NEPA analyses for individual basins.
- ACMs would be implemented to restore and enhance habitat for federally listed or special status species and would be done in cooperation with the USFWS. These measures would restore or enhance habitat for springsnails (ACMs C.2.6 and C.2.16), White River spinedace (ACMs C.2.8 and C.2.17), White River springfish (ACMs C.2.9), Hiko White River springfish (ACM C.2.9), Pahranagat roundtail chub (ACM C.2.9), White River speckled dace (ACM C.2.14), and northern leopard frog (ACM C.2.18).

Monitoring Recommendations

GW-MN-AB-1 (Stream Flow and Aquatic Biology Monitoring) and **GW-MN-AB-2 (Spring and Aquatic Biology Monitoring)** described for the Proposed Action, would be applied to Alternative B. Springs and streams to be considered for monitoring are provided in **Appendix F3.7**, **Tables F3.7-16** and **F3.7-17**. Streams and springs located on public lands are listed in **Table 3.3.2-9** in Water Resources.

GW-MN-AB-3 (Flow/Habitat Determination) will be conducted in selected springs and streams to be able to determine minimum flows or water levels for critical life stages of representative fish species.

As described in Water Resources, Section 3.3, GW-WR-3a (Comprehensive Water Resources Monitoring Plan) would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

Table 3.7-11 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative B Pumping (Continued)

Mitigation Recommendations
GW-AB-3 (Flow Change Mitigation) described for the Proposed Action, also would be applied to Alternative B. As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7). **GW-WR-5 (Shoshone Ponds Mitigation)** would avoid a conflict with management objectives for Pahrump poolfish (see Water Resources, Section 3.3, for complete wording of GW-WR-5).
Potential Residual Impacts
• The COM Plan, ACMs, and monitoring and mitigation measures could be effective in reducing impacts to aquatic habitats and species. The objectives of the COM Plan are to avoid impacts to listed species and critical habitat and avoid, minimize, or mitigate adverse impacts to fish. However, it is not possible to determine the level of impact reduction at this time. Effects on some aquatic habitats and species could exist considering the potential long recovery period that could occur in some aquatic habitats. Some unavoidable impacts on aquatic habitat and species could occur at some locations.

[1] Parameters are based on streams or springs that are located within the 10-foot drawdown contour and characterized as having moderate or high risk of pumping effects.

[2] A study by Elliott et al. (2006) indicated that other streams at risk include Shingle and Williams Canyon creeks in Spring Valley and Baker and Strawberry creeks in Snake Valley.

3.7.2.12 Alternative C

Groundwater Development Area

Surface disturbance would be dispersed throughout the five groundwater development basins (Snake, Spring, Cave, Dry Lake, and Delamar). The effects of constructing well pads, gathering pipelines, and electrical service lines would depend upon the location of the facilities in relation to aquatic biological resources. In total, 23 perennial streams and 5 springs with aquatic biological resources occur in the groundwater development areas. A more detailed account of the resource information includes:

- Game Fish – Species occur in 2 streams in Snake Valley and 13 streams in Spring Valley (**Table 3.7-1**; **Figure 3.7-3**).
- Special Status Fish – Bonneville cutthroat trout occurs in one stream (Big Wash in Snake Valley) (**Figure 3.7-3**).
- Special Status Amphibians – Northern leopard frog occurs in three springs (Blind, North Millick, and South Millick in Spring Valley) within the groundwater development areas (**Figure 3.7-4**).
- Springsnails – Toquerville pyrg (not a special status species) occurs in two springs within the groundwater development areas (unnamed spring southwest of Caine Spring in Snake Valley and unnamed spring near Cleve Creek in Spring Valley) (**Figure 3.7-4**).
- Macroinvertebrates – Species are present in all 17 perennial streams and 5 springs and waterbodies with seasonal water presence in the groundwater development area.

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-12** along with ACMs and proposed mitigation.

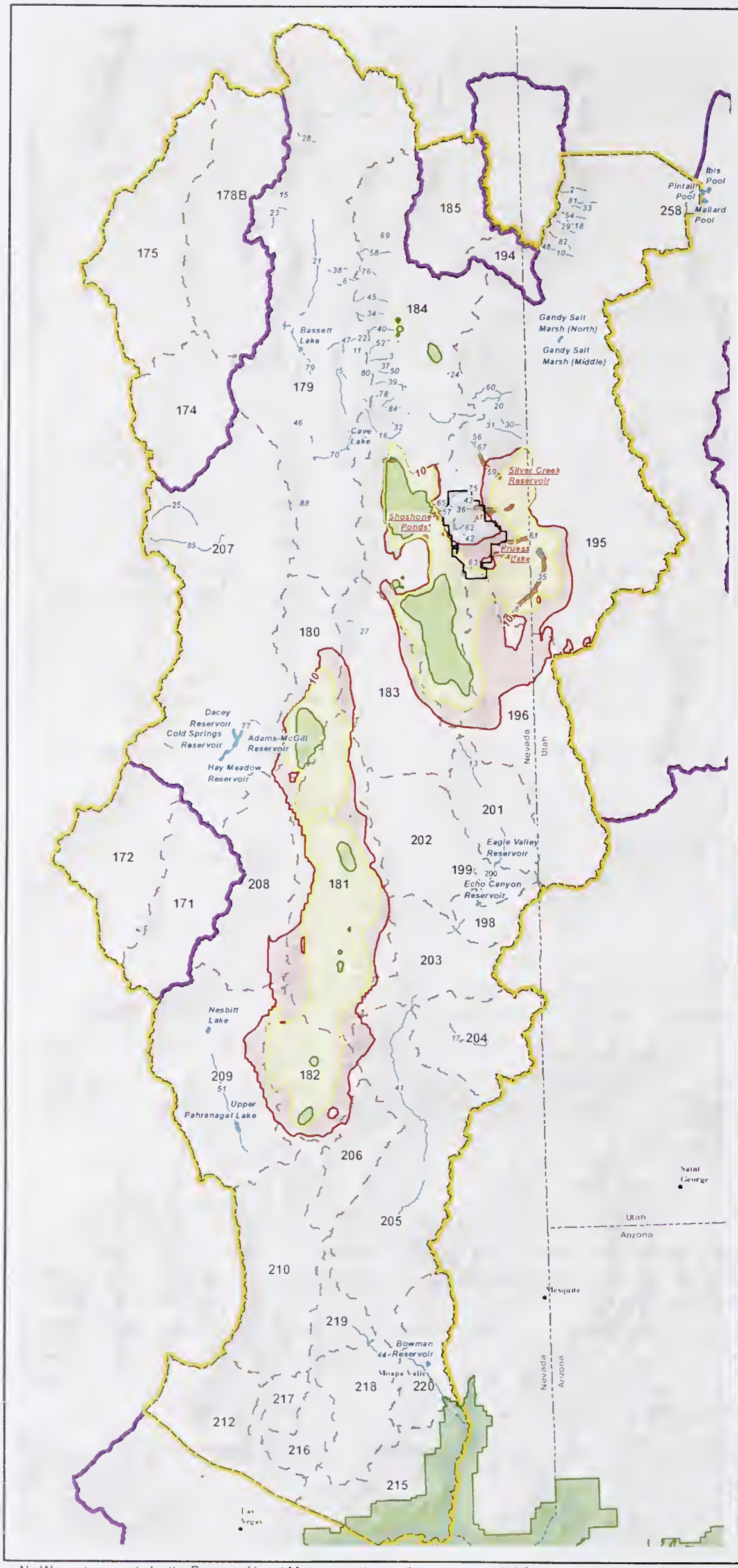
Table 3.7-12 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative C Groundwater Development

Effects
• Construction could alter aquatic habitat on a short-term basis in 17 perennial streams and 5 springs with aquatic biological resources. Riparian vegetation near waterbodies could be affected on a long-term basis. Surface disturbance and vehicle/equipment could affect water quality from sediment input and risks from fuel spills on a short-term basis. • Instream activities in the spring or fall could affect trout spawning on a short-term basis. • Vehicle traffic near waterbodies could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods. • Special status Bonneville cutthroat trout could be affected in one stream within the groundwater development areas (Big Wash in Snake Valley). • Special status amphibian species (northern leopard frog) could be affected in three springs within the groundwater development areas. • Springsnail species could be affected in spring habitats within two of the groundwater development areas (one unnamed spring in Spring Valley and one spring in Snake Valley). • Conflicts with conservation management objectives could occur for two species: Bonneville cutthroat trout (Big Wash) and northern leopard frog (3 springs). • Game fish species considered to be traditional values to regional Tribes could be affected in Snake and Spring valleys.
COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and mitigation recommendations.
BLM RMP Direction and ACMs
• BLM RMP direction for development near springs specifies that surface water resources and associated riparian areas be maintained. ACM B.1.1 and B.1.3 will consider the presence of special status species and their habitat in the location of production wells, collector lines, and secondary substations. • ACM B.2.1 through B.2.3 will implement permit requirements on well drilling, abandonment, drilling, and water discharge.
Proposed Mitigation
GW-AB-1 (Avoidance of springs and wetlands with special status species) and **GW-AB-2 (Establishing a 0.5-mile buffer near perennial streams with game fish and special status species)**, as described for the Proposed Action, would be applied to Alternative C.
Conclusions
• By avoiding springs and streams with game fish or special status species, short-term disturbance would be limited to waterbodies with seasonal flow or limited water volumes. Macroinvertebrates likely would be present in these waterbodies. • Vehicle traffic could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods.
Potential Residual Impacts
• Potential amphibian mortalities from vehicle traffic near temporary and permanent waterbodies during construction.

Groundwater Pumping

Alternative C would consist of intermittent pumping (between 12,000 to 114,755 afy) at distributed locations in Snake, Spring, Delamar, Dry Lake, and Cave valleys based on a conceptual drought scenario. Alternative C pumping could result in reductions in aquatic habitat and affect aquatic species. Based on the model analysis, the predicted 10-foot drawdown contour for Alternative C pumping is shown for streams in **Figure 3.7-13** and springs in **Figure 3.7-14**. Flows could be reduced in the following number of habitats with aquatic biological resources for the three model time frames.

- Streams – 1 at full build out, 12 at full build out plus 75 years, and 13 at full build out plus 200 years; and
- Springs/Ponds/Lakes – 2 at full build out, 13 at full build out plus 75 years, and 20 at full build out plus 200 years.



#	Stream Name
1	Baker Creek
2	Basin Creek
3	Bassett Creek
4	Bastian Creek
5	Berry Creek
6	Big Indian Creek
7	Big Negro Creek
8	Big Springs Creek
9	Big Wash
10	Birch Creek
11	Bird Creek
12	Board Creek
13	Camp Valley Creek
14	Cave Creek
15	Cherry Creek
16	Cleve Creek
17	Clover Creek
18	Cottonwood Creek
19	Deadman Creek
20	Deep Canyon Creek
21	Duck Creek
22	East Creek
23	Egan Creek
24	Eightmile Creek
25	Ellison Creek
26	Forest Home Creek
27	Geyser Creek
28	Goshute Creek
29	Granite Creek
30	Hampton Creek
31	Hendry's Creek
32	Indian Creek
33	Indian Farm Creek
34	Kalamazoo Creek
35	Lake Creek
36	Lehman Creek
37	Little Negro Creek
38	Mattier Creek
39	McCoy Creek
40	Meadow Creek
41	Meadow Valley Wash
42	Middle Fork Snake Creek
43	Mill Creek
44	Muddy River
45	Muncy Creek
46	Murry Creek
47	North Creek
48	North Fork of Birch Creek
49	North Fork Snake Creek
50	Odgers Creek
51	Pahranagat Creek
52	Piermont Creek
53	Pine Creek
54	Red Cedar Creek
55	Ridge Creek
56	Second Fork Silver Creek
57	Shingle Creek
58	Siegel Creek
59	Silver Creek
60	Smith Creek
61	Snake Creek
62	South Fork Baker Creek
63	South Fork Big Wash
64	South Fork Snake Creek
65	South Fork Willard Creek
66	South Taft Creek
67	Spring Creek (Tributary to Silver Creek)
68	Spring Creek (Tributary to Snake Creek)
69	Spring Valley Creek
70	Steptoe Creek
71	Steptoe Ranch Stream 3
72	Steptoe Ranch Stream 4a
73	Steptoe Ranch Stream 4b
74	Steptoe Ranch Stream 5
75	Strawberry Creek
76	Sunkist (North) Creek
77	Sunnyside Creek
78	Taft Creek
79	Tailings Creek
80	Timber Creek
81	Tom's Creek
82	Trout Creek
83	Upper Snake Creek
84	Vipont Creek
85	White River
86	Willard Creek
87	Williams Canyon Creek
88	Willow Creek

Underlined streams may be affected where "At Risk" stream segments intersect drawdown.

Potentially Affected "At Risk" Stream Segment

Potentially Affected "At Risk" Waterbody

Legend

Water Features Containing Sensitive Aquatic Biology or Game Fish

- Perennial Stream Reach
- Waterbody
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

* Fed by artesian well

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-13

Alternative C Drawdown and Streams/ Waterbodies with Aquatic Biological Resources

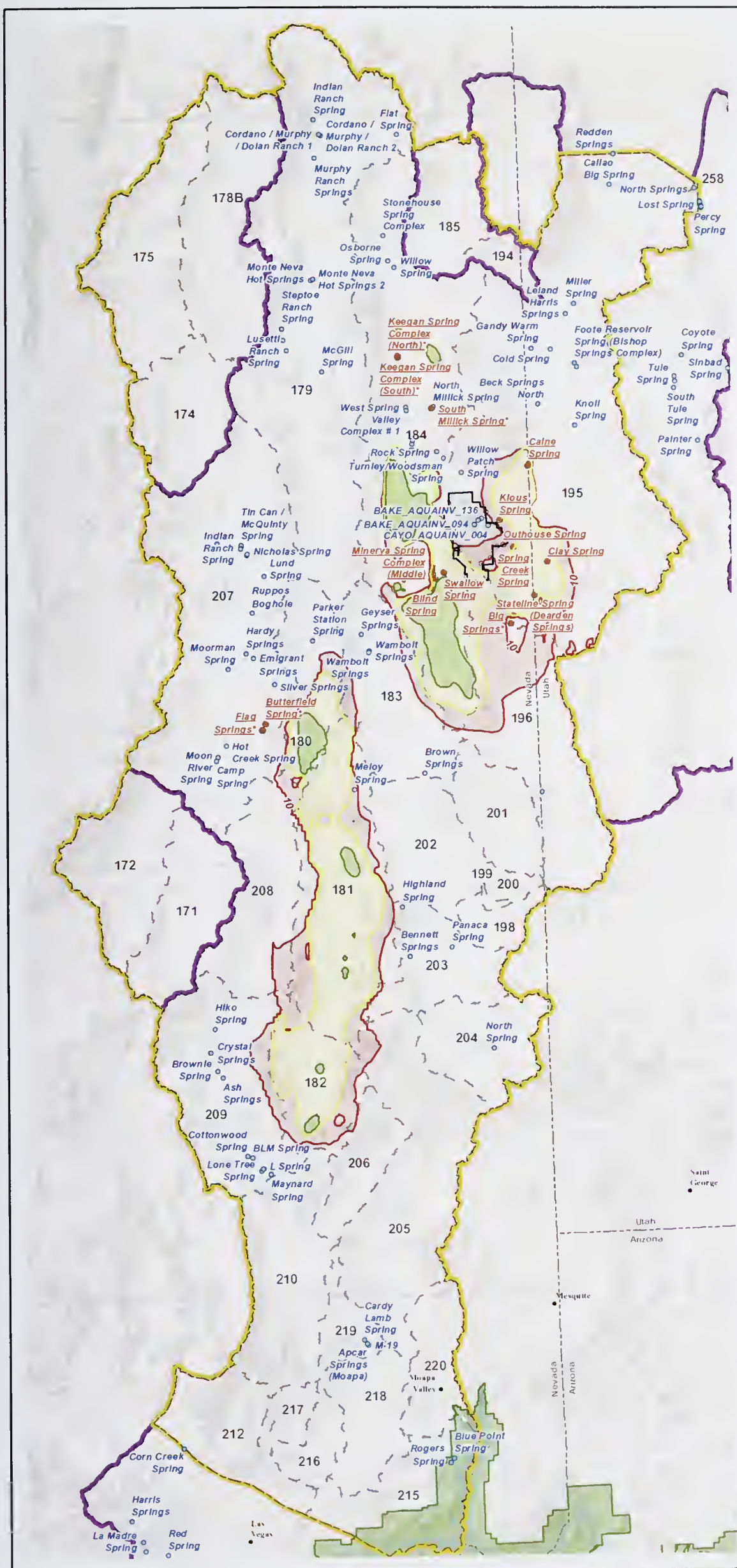
0 5 10 15 20 25 50 Miles

0 5 10 15 20 25 50 75 Kilometers

1:2,000,000

N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data



Legend

- Spring Containing Sensitive Aquatic Biology or Game Fish
- Potentially Affected Spring Containing Sensitive Aquatic Biology or Game Fish
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

*Spring is outside 10-ft drawdown contour, but model-predicted flow reductions indicate potential effect.

Basin #	Basin Name	Basin #	Basin Name
171	Coal Valley	202	Patterson Valley
172	Garden Valley	203	Panaca Valley
174	Jakes Valley	204	Clover Valley
175	Long Valley	205	Lower Meadow Valley Wash
178B	Butte Valley (Southern Part)	206	Kane Springs Valley
179	Steptoe Valley	207	White River Valley
180	Cave Valley	208	Pahroc Valley
181	Dry Lake Valley	209	Pahranagat Valley
182	Delamar Valley	210	Coyote Spring Valley
183	Lake Valley	212	Las Vegas Valley
184	Spring Valley	215	Black Mountain Area
185	Tippett Valley	216	Garnet Valley
194	Pleasant Valley	217	Hidden Valley (North)
195	Snake Valley	218	California Wash
196	Hamlin Valley	219	Muddy River Springs Area
198	Dry Valley	220	Lower Moapa Valley
199	Rose Valley	258	Fish Springs Flat
200	Eagle Valley		
201	Spring Valley		

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-14

Alternative C Drawdown and Springs with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles
0 5 10 15 20 25 50 75 Kilometers
1:2,000,000

N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

Flow reductions could affect all types of aquatic communities including fish, amphibians, macroinvertebrates, macrophytes, and algae. For this EIS analysis, emphasis was placed on game fish and special status aquatic species. Alternative C could adversely affect the following game fish or special status species and their associated waterbody occurrences in at least one of the model time frames. Specific results for waterbodies and species at risk for each model time frames are provided in **Appendix F**, **Tables F3.7-18** and **F3.7-19**.

- Game Fish Streams – Baker, Big Wash, Lake, Lehman, Silver, and Snake creeks in Snake Valley; Bastian, Pine, Ridge, Shingle, and Williams Canyon creeks in Spring Valley.
- Game Fish Springs/Ponds/Lakes – Swallow Spring in Spring Valley; Pruess Lake, Rowland Spring, and Silver Creek Reservoir in Snake Valley.
- Federally Listed Species – Pahrump poolfish in Shoshone Pones (Spring Valley).
- Bonneville Cutthroat Trout – Stream miles at risk for flow reductions include: Pine (0.1 mile or 12 percent of occupied habitat in this stream), Ridge (0.6 mile or 50 percent of occupied habitat in this stream), Big Wash (2.6 to 4.8 miles or 54 to 100 percent of occupied habitat in this stream), and Snake (<0.1 mile or <1 percent of occupied habitat in this stream).
- Other Special Status Fish Streams – Baker, Big Wash, and Snake creeks in Snake Valley; and Pine and Ridge creeks in Spring Valley.
- Other Special Status Fish Springs/Ponds/Lakes – Keegan and Shoshone Ponds in Spring Valley; and Big Springs and Stateline Springs in Snake Valley.
- Special Status Amphibian Species Springs/Ponds/Lakes – Blind, Keegan, Minerva, North Millick, South Millick, and Shoshone Ponds in Spring Valley.
- Special Status Invertebrates Springs/Ponds/Lakes – Big Springs, Clay, Stateline, and one unnamed spring, and Pruess Lake in Snake Valley.

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-13** along with ACMs and proposed mitigation.

Table 3.7-13 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative C Pumping

Effects/Conclusions
• Flow reductions would modify habitat by decreasing depths, water velocities, and wetted area in spring/pond/lake and stream habitats. A total of 19 springs/ponds/lakes and 13 streams are at risk when considering the longest model time frame. • Effects would be most pronounced in riffle habitats in streams and spring inflow and outflow areas. Effects on pool habitats would depend on the magnitude of the flow change and size of the pools. Reduced flows could adversely affect aquatic habitat by altering thermal regimes, increasing sedimentation, and reducing riparian cover. A complete loss of habitat could occur in small springs and larger springs such as Big Springs in Snake Valley. • Flow reductions could adversely affect aquatic species by reducing abundance and diversity, altering composition, reducing food sources, limiting spawning and early life stage development, and decreasing individual health condition. • Flow reductions in 6 springs/ponds in Spring Valley could result in habitat reductions and adverse effects on the special status amphibian, northern leopard frog. • Flow reductions in Big Springs Creek and Lake Creek in Snake Valley could result in substantial loss of habitat and aquatic species. • Flow reductions in 4 springs in Snake Valley could result in loss of bifid duct and longitudinal gland pyrg populations at these locations. • Conflicts with management objectives could occur for three species: Pahrump poolfish (Shoshone Ponds), Bonneville cutthroat trout (2 streams each in Spring and Snake valleys), and northern leopard frog (5 springs/ponds). • Game fish species considered to be traditional values to regional Tribes could be affected in Snake and Spring valleys.

Table 3.7-13 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative C Pumping (Continued)

Impact Indicators[1] By Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Hydrologic Basins at Risk with Waterbodies Containing Game Fish or Special Status Species	1	2	2
Estimated Percent Flow Reductions			
Butterfield Spring (White River Valley)	0	2	5
Flag Springs (White River Valley)	1	2	5
Keegan Spring (Spring Valley)	12	14	15
North Millick Spring (Spring Valley)	4	5	5
South Millick Spring (Spring Valley)	10	12	11
Big Springs (Snake Valley)	2	87	100
Federally Listed Species at Risk			
Pahrump poolfish	Unlikely effect	Potential effect	Potential effect
White River spinedace and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
Hiko White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
Pahranagat roundtail chub	No effect	No effect	No effect
Big Springs spinedace and critical habitat	No effect	No effect	No effect
Moapa dace	No effect	No effect	No effect
Number of Springs/Ponds/Lakes with Game or Special Status Fish Species at Risk	1	7	9
Number of Springs/Ponds/Lakes with Special Status Amphibian Species at Risk	2	4	6
Number of Springs/Ponds/Lakes with Special Status Invertebrate Species at Risk	0	5	5
Number of Small Springs (100 gpm) with Aquatic Species at Risk	0	3	6
Number of Streams with Game Fish or Special Status Species at Risk	1	12	13
Miles of Streams at Risk with Game Fish and Special Status Species	1	29	43
GBNP Springs and Streams[2] with Game Fish or Special Status Species at Risk			
Outhouse Spring	Unlikely effect	Unlikely effect	Potential effect
Rowland Spring	Unlikely effect	Unlikely effect	Unlikely effect
Lehman Creek	Unlikely effect	Unlikely effect	<0.1 mile
Snake Creek	Unlikely effect	Unlikely effect	1.9 miles
Utah Springs and Streams with Game Fish or Special Status Species at Risk			
Caine Spring	Unlikely effect	Potential effect	Potential effect
Clay Spring	Unlikely effect	Potential effect	Potential effect
Stateline Spring	Unlikely effect	Potential effect	Potential effect
Lake Creek	Unlikely effect	10.6 miles	10.6 miles
Snake Creek	Unlikely effect	1.2 miles	1.2 miles
COM Plan			
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional monitoring and mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and mitigation recommendations.			

Table 3.7-13 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative C Pumping (Continued)

ACMs
• Existing agreements include the Spring Valley Stipulation, Dry Lake, Delamar, Cave valleys Stipulation, Conservation Agreements (least chub and Columbia spotted frog) Utah and SNWA Snake Valley Environmental Monitoring and Management Agreement (not yet completed), and Candidate Conservation Agreement/Candidate Conservation Agreement with Assurances (not yet completed). • The Spring Valley and Dry Lake, Delamar, Cave valleys Stipulated Agreements will involve monitoring in selected springs in Spring, Snake, Delamar, Dry Lake, and Cave valleys (see ACMs C.1.1 and C.1.42 in **Appendix E**). The Spring Valley Stipulated Agreement also would consider alternative withdrawal points from Shoshone Ponds. • Actions will be implemented as part of the Spring Valley and Dry Lake, Delamar, Cave valleys Stipulated Agreements to mitigate unreasonable adverse impacts to special status species (ACM C.2.1). Specific measures related to the mitigation will be developed as part of the monitoring and mitigation planning process. This process would extend into subsequent NEPA analyses for individual basins. • ACMs would be implemented to restore and enhance habitat for federally listed or special status species and would be done in cooperation with the USFWS. These measures would restore or enhance habitat for springsnails (ACM C.2.6 and C.2.16), White River spinedace (ACMs C.2.8 and C.2.17), White River springfish (ACM C.2.9), Hiko White River springfish (ACM C.2.9), Pahranagat roundtail chub (ACM C.2.9), White River speckled dace (ACM C.2.14), and northern leopard frog (ACM C.2.18).
Monitoring Recommendations
GW-MN-AB-1 (Stream Flow and Aquatic Biology Monitoring) and **GW-MN-AB-2 (Spring and Aquatic Biology Monitoring)** described for the Proposed Action, would be applied to Alternative C. Springs and streams to be considered for monitoring are provided in **Appendix F3.7**, **Tables F3.7-16** and **F3.7-17**. Streams and springs located on public lands are listed in **Table 3.3.2-9** in Water Resources. **GW-MN-AB-3 (Flow/Habitat Determination)** will be conducted in selected springs and streams to be able to determine minimum flows or water levels for critical life stages of representative fish species. As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).
Mitigation Recommendations
GW-AB-3 (Flow Change Mitigation) described for the Proposed Action, also would be applied to Alternative C. As described in **Water Resources, Section 3.3, GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7). **GW-WR-5 (Shoshone Ponds Mitigation)** would avoid a conflict with management objectives for Pahrump poolfish (see Water Resources, Section 3.3 for complete wording of GW-WR-5).
Potential Residual Impacts
• The COM Plan, ACMs, and monitoring and mitigation measures could be effective in reducing impacts to aquatic habitats and species. The objectives of the COM Plan are to avoid impacts to listed species and critical habitat and avoid, minimize, or mitigate impacts to fish. However, it is not possible to determine the level of impact reduction at this time. Effects on some aquatic habitats and species could exist considering the potential long recovery period that could occur in some aquatic habitats. Some unavoidable adverse impacts on aquatic habitat and species could occur at some locations.

[1] Parameters are based on streams or springs that are located within the 10-foot drawdown contour and characterized as having moderate or high risk of pumping effects.

[2] A study by Elliott et al. (2006) indicated that other streams at risk include Shingle and Williams Canyon creeks in Spring Valley and Baker and Strawberry creeks in Snake Valley.

3.7.2.13 Alternative D

Groundwater Development Area

Development in Snake Valley and the White County portion of Spring Valley would be eliminated. Surface disturbance could be dispersed throughout the remaining portions of Spring, Cave, Delamar, and Dry Lake basins. The

effects of constructing well pads, gathering pipelines, and electrical service lines would depend upon the location of the facilities in relation to aquatic biological resources. No perennial streams or spring habitat with aquatic biological resources occur in the groundwater development areas. No game fish or special status species are present in intermittent streams or springs with the Alternative D development areas. Macroinvertebrates would likely occur in these waterbodies.

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-14** along with ACMs and proposed mitigation.

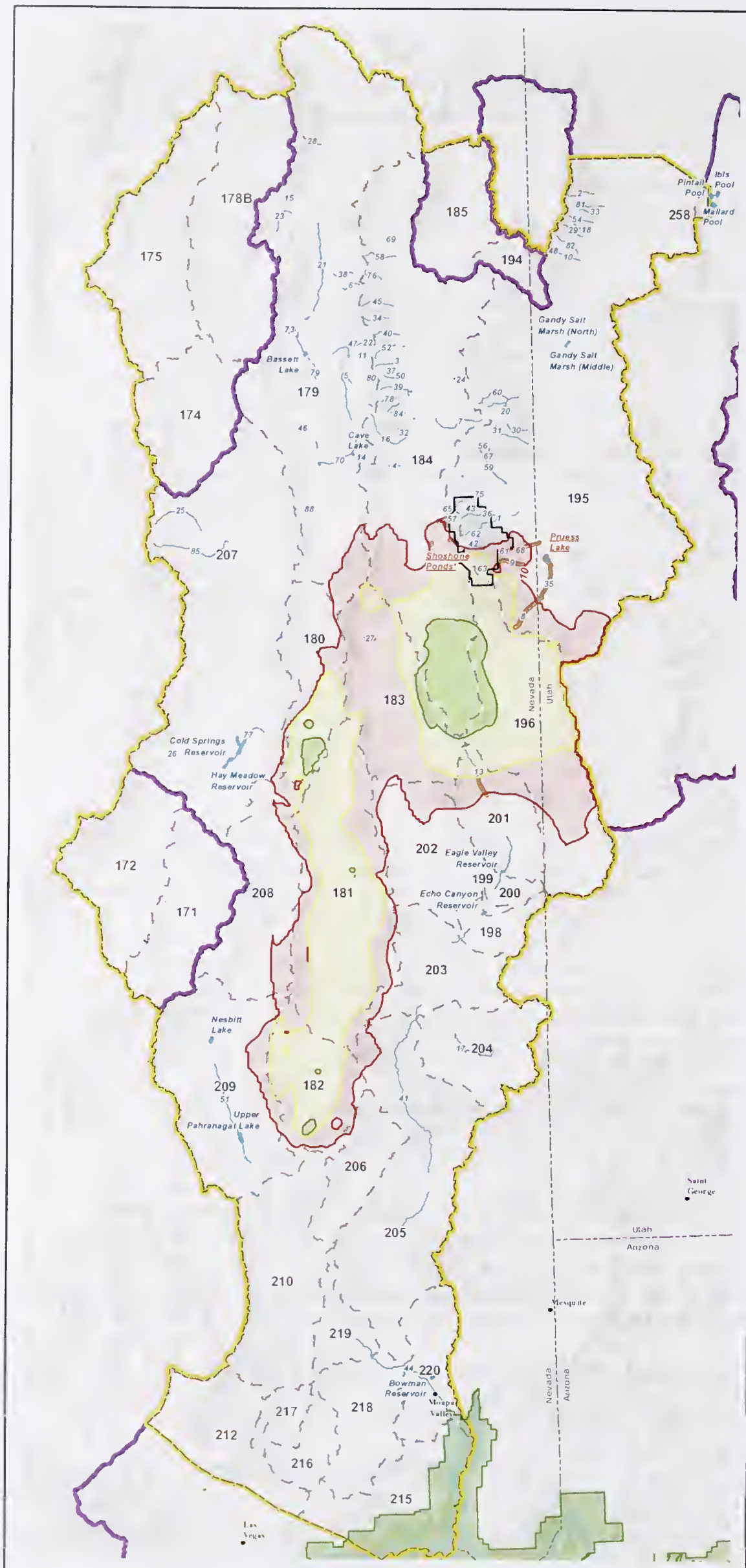
Table 3.7-14 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative D Groundwater Development

Effects
• Construction could alter aquatic habitat on a short-term basis in intermittent streams or springs that contain macroinvertebrates. Riparian vegetation near waterbodies could be affected on a long-term basis. Surface disturbance and vehicle/equipment could affect water quality from sediment input and risks from fuel spills on a short-term basis. • Vehicle traffic near waterbodies could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods. • There would be no conflicts with management objectives for special status species. • There would be no effects on fish species considered to be traditional values to regional Tribes.
COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and mitigation recommendations.
BLM RMP Direction and ACMs
• BLM RMP direction for development near springs specifies that surface water resources and associated riparian areas be maintained. • ACM B.1.1 and B.1.3 will consider the presence of special status species and their habitat in the location of production wells, collector lines, and secondary substations. • ACM B.2.1 through B.2.3 will implement permit requirements on well drilling, abandonment, drilling, and water discharge.
Proposed Mitigation
No mitigation measures would be required for Alternative D because perennial and springs are not present within the groundwater development areas.
Conclusions • By avoiding springs and streams with game fish or special status species, short-term disturbance would be limited to waterbodies with seasonal flow or limited water volumes. Macroinvertebrates likely would be present in these waterbodies. • Vehicle traffic could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods.
Potential Residual Impacts
• Potential amphibian mortalities from vehicle traffic near temporary and permanent waterbodies during construction.

Groundwater Pumping

Alternative D would consist of reduced pumping (78,755 afy) at distributed locations in southern Spring, Delamar, Dry Lake, and Cave valleys. No pumping would occur in Snake Valley. Alternative D pumping could result in reductions in aquatic habitat and affect aquatic species. Based on the model analysis, the predicted 10-foot drawdown contour for Alternative D pumping is shown for streams in **Figure 3.7-15** and springs in **Figure 3.7-16**. Flows could be reduced in the following number of habitats with aquatic biological resources for the three model time frames.

- Streams – 0 at full build out, 2 at full build out plus 75 years, and 10 at full build out plus 200 years; and
- Springs/Ponds/Lakes - 1 at full build out, 4 at full build out plus 75 years, and 13 at full build out plus 200 years.



#	Stream Name	#	Stream Name
1	Baker Creek	46	Murry Creek
2	Basin Creek	47	North Creek
3	Bassett Creek	48	North Fork of Birch Creek
4	Bastian Creek	49	North Fork Snake Creek
5	Berry Creek	50	Odgers Creek
6	Big Indian Creek	51	Pahranagat Creek
7	Big Negro Creek	52	Piermont Creek
8	Big Springs Creek	53	Pine Creek
9	Big Wash	54	Red Cedar Creek
10	Birch Creek	55	Ridge Creek
11	Bird Creek	56	Second Fork Silver Creek
12	Board Creek	57	Shingle Creek
13	Camp Valley Creek	58	Siegel Creek
14	Cave Creek	59	Silver Creek
15	Cherry Creek	60	Smith Creek
16	Cleve Creek	61	Snake Creek
17	Clover Creek	62	South Fork Baker Creek
18	Cottonwood Creek	63	South Fork Big Wash
19	Deadman Creek	64	South Fork Snake Creek
20	Deep Canyon Creek	65	South Fork Willard Creek
21	Duck Creek	66	South Taft Creek
22	East Creek	67	Spring Creek (Tributary to Silver Creek)
23	Egan Creek	68	Spring Creek (Tributary to Snake Creek)
24	Eightmile Creek	69	Spring Valley Creek
25	Ellison Creek	70	Steptoe Creek
26	Forest Home Creek	71	Steptoe Ranch Stream 3
27	Geyser Creek	72	Steptoe Ranch Stream 4a
28	Goshute Creek	73	Steptoe Ranch Stream 4b
29	Granite Creek	74	Steptoe Ranch Stream 5
30	Hampton Creek	75	Strawberry Creek
31	Hendry's Creek	76	Sunkist (North) Creek
32	Indian Creek	77	Sunnyside Creek
33	Indian Farm Creek	78	Taft Creek
34	Kalamazoo Creek	79	Tailings Creek
35	Lake Creek	80	Timber Creek
36	Lehman Creek	81	Tom's Creek
37	Little Negro Creek	82	Trout Creek
38	Mattier Creek	83	Upper Snake Creek
39	McCoy Creek	84	Vipont Creek
40	Meadow Creek	85	White River
41	Meadow Valley Wash	86	Willard Creek
42	Middle Fork Snake Creek	87	Williams Canyon Creek
43	Mill Creek	88	Willow Creek
44	Muddy River		
45	Muncy Creek		

Underlined streams may be affected where "At Risk" stream segments intersect drawdown.

Potentially Affected "At Risk" Stream Segment

Potentially Affected "At Risk" Waterbody

Legend

Water Features Containing Sensitive Aquatic Biology or Game Fish

- Perennial Stream Reach
- Waterbody
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

* Fed by artesian well

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-15

Alternative D Drawdown and Streams/ Waterbodies with Aquatic Biological Resources

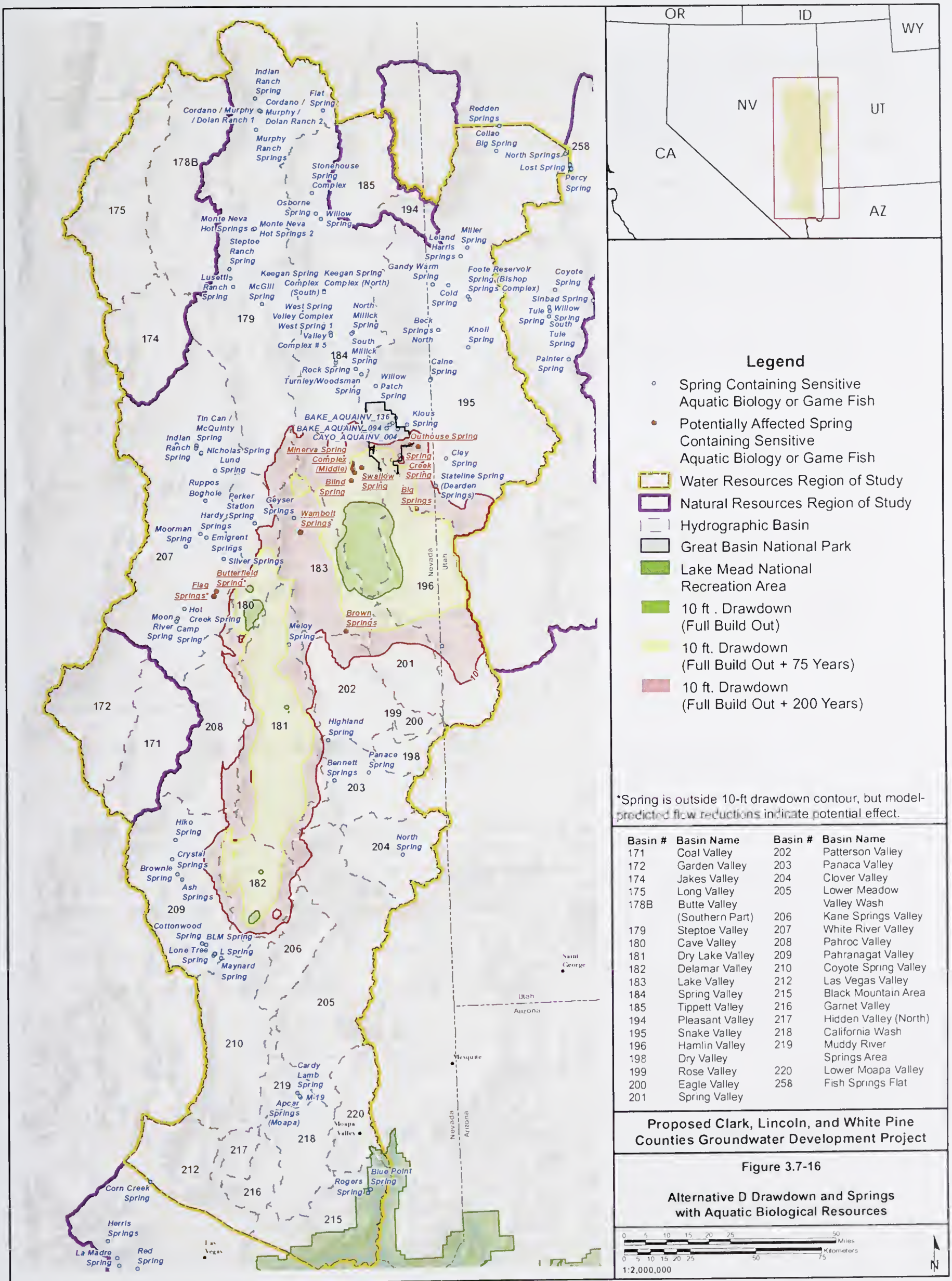
0 5 10 15 20 25 50 Miles

0 5 10 15 20 25 50 75 Kilometers

1:2,000,000

N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual use or aggregate use with other data



Legend

- Spring Containing Sensitive Aquatic Biology or Game Fish
- Potentially Affected Spring Containing Sensitive Aquatic Biology or Game Fish
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

*Spring is outside 10-ft drawdown contour, but model-predicted flow reductions indicate potential effect.

Basin #	Basin Name	Basin #	Basin Name
171	Coal Valley	202	Patterson Valley
172	Garden Valley	203	Panaca Valley
174	Jakes Valley	204	Clover Valley
175	Long Valley	205	Lower Meadow Valley Wash
178B	Butte Valley (Southern Part)	206	Kane Springs Valley
179	Steptoe Valley	207	White River Valley
180	Cave Valley	208	Pahroc Valley
181	Dry Lake Valley	209	Pahranagat Valley
182	Delamar Valley	210	Coyote Spring Valley
183	Lake Valley	212	Las Vegas Valley
184	Spring Valley	215	Black Mountain Area
185	Tippett Valley	216	Garnet Valley
194	Pleasant Valley	217	Hidden Valley (North)
195	Snake Valley	218	California Wash
196	Hamlin Valley	219	Muddy River Springs Area
198	Dry Valley	220	Lower Moapa Valley
199	Rose Valley	258	Fish Springs Flat
200	Eagle Valley		
201	Spring Valley		

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-16

Alternative D Drawdown and Springs with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles
0 5 10 15 20 25 50 75 Kilometers
1:2,000,000

N

No Warranty is made by the Bureau of Land Management as to the accuracy reliability, or completeness of these data for individual use or aggregate use with other data

Flow reductions could affect all types of aquatic communities including fish, amphibians, macroinvertebrates, macrophytes, and algae. For this EIS analysis, emphasis was placed on game fish and special status aquatic species. Alternative D could adversely affect the following game fish or special status species and their associated waterbody occurrences in at least one of the model time frames. Specific results for waterbodies and species at risk for each model time frames are provided in **Appendix F**, **Tables F3.7-20** and **F3.7-21**.

- Game Fish Streams – Geyser Creek in Lake Valley; Big Wash Lake, and Snake creeks in Snake Valley; Pine, Ridge, Shingle, and Williams Canyon creeks in Spring Valley (#184).
- Game Fish Springs/Ponds/Lakes – Swallow Spring in Spring Valley (#184).
- Federally Listed Species – White River spinedace and critical habitat in Flag Springs (White River Valley) and Pahrump poolfish in Shoshone Ponds (Spring Valley).
- Bonneville Cutthroat Trout – Stream miles at risk for flow reductions include: Pine (0.1 mile or 12 percent of occupied habitat in this stream), Ridge (0.6 mile or 50 percent of occupied habitat in this stream), Big Wash (4.8 miles or 100 percent of occupied habitat in this stream), and Snake (<0.1 mile or <1 percent of occupied habitat in this stream).
- Other Special Status Fish Streams – Big Wash and Snake creeks in Snake Valley; and Pine and Ridge creeks in Spring Valley (#184).
- Other Special Status Fish Springs/Ponds/Lakes – Butterfield and Flag springs in White River Valley; Shoshone Ponds in Spring Valley (#184); and Big Springs and Stateline Springs in Snake Valley.
- Special Status Amphibian Species Springs/Ponds/Lakes – Blind and Minerva springs and Shoshone Ponds in Spring Valley (#184); and Wambolt Spring in Lake Valley.
- Special Status Invertebrates Springs/Ponds/Lakes – Butterfield and Flag springs in White River Valley; Big Springs, and one unnamed spring, in Snake Valley; unnamed spring near Camp Valley Creek in Spring Valley (#201), and Wambolt Spring in Lake Valley.

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-15** along with ACMs and proposed mitigation.

Table 3.7-15 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative D Pumping

Effects/Conclusions
• Flow reductions would modify habitat by decreasing depths, water velocities, and wetted area in spring/pond/lake and stream habitats. A total of 13 springs/ponds/lakes and 10 streams are at risk when considering the longest model time frame. • Effects would be most pronounced in riffle habitats in streams and spring inflow and outflow areas. Effects on pool habitats would depend on the magnitude of the flow change and size of the pools. Reduced flows could adversely affect aquatic habitat by altering thermal regimes, increasing sedimentation, and reducing riparian cover. A complete loss of habitat could occur in small springs and larger springs such as Big Springs in Snake Valley. • Flow reductions could adversely affect aquatic species by reducing abundance and diversity, altering composition, reducing food sources, limiting spawning and early life stage development, and decreasing individual health condition. • Flow reductions in 4 springs in Spring Valley could result in habitat reductions and adverse effects on the special status amphibian, northern leopard frog. • Flow reductions in Big Springs Creek and Lake Creek in Snake Valley could result in substantial loss of habitat and aquatic species. • Flow reductions in 2 springs in Snake Valley could result in loss of bifid duct and longitudinal gland pyrg populations at these locations. • Due to their limited occurrence (one spring/one basin), populations of Butterfield pyrg (Butterfield Spring), Flag pyrg (Flag Springs), Camp Valley pyrg (unnamed spring near Camp Valley Creek), and Lake Valley pyrg (Wambolt Spring) could be lost if their spring habitat is substantially reduced.

Table 3.7-15 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative D Pumping (Continued)

Effects/Conclusions			
• Conflicts with recovery and conservation management objectives could occur for four species: Pahrump poolfish (Shoshone Ponds), White River spinedace (Flag Springs), Bonneville cutthroat trout (two streams each in Spring and Snake valleys), and northern leopard frog (four springs/ponds). • Game fish species considered to be traditional values to regional Tribes could be affected in Snake, Spring (#184), Lake, and Spring (#201) valleys.			
Impact Indicators[1] By Model Time Frame	**Full Build Out**	**Full Build Out Plus 75 Years**	**Full Build Out Plus 200 Years**
Number of Hydrologic Basins at Risk with Waterbodies Containing Game Fish or Special Status Species	1	2	45
Estimated Percent Flow Reductions			
Butterfield Spring (White River Valley)	1	3	9
Flag Springs (White River Valley)	1	3	9
Keegan Spring (Spring Valley)	0	0	0
North Millick Spring (Spring Valley)	0	0	0
South Millick Spring (Spring Valley)	0	0	0
Big Springs (Snake Valley)	19	100	100
Federally Listed Species at Risk			
Pahrump poolfish	Unlikely effect	Potential effect	Potential effect
White River spinedace and critical habitat	Unlikely effect	Unlikely effect	Potential effect
Hiko White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
Pahranagat roundtail chub	No effect	No effect	No effect
Big Springs spinedace and critical habitat	No effect	No effect	No effect
Moapa dace	No effect	No effect	No effect
Number of Springs/Ponds/Lakes with Game or Special Status Fish Species at Risk	1	2	5
Number of Springs/Ponds/Lakes with Special Status Amphibian Species at Risk	0	2	4
Number of Springs/Ponds/Lakes with Special Status Invertebrate Species at Risk	1	2	6
Number of Small Springs (100 gpm) with Aquatic Species at Risk	0	1	5
Number of Streams with Game Fish or Special Status Species at Risk	0	2	10
Miles of Streams at Risk with Game Fish and Special Status Species	0	3	29
GBNP Springs and Streams[2] with Game Fish or Special Status Species at Risk			
Outhouse Spring	Unlikely effect	Unlikely effect	Potential effect
Rowland Spring	Unlikely effect	Unlikely effect	Unlikely effect
Snake Creek	Unlikely effect	Unlikely effect	1.9 miles
Utah Springs and Streams with Game Fish or Special Status Species at Risk			
Caine Spring	Unlikely effect	Unlikely effect	Unlikely effect
Clay Spring	Unlikely effect	Unlikely effect	Unlikely effect
Stateline Spring	Unlikely effect	Unlikely effect	Unlikely effect
Lake Creek	Unlikely effect	Unlikely effect	10.6 miles
Snake Creek	Unlikely effect	Unlikely effect	Unlikely effect
COM Plan			
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional monitoring and mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and mitigation recommendations.			

Table 3.7-15 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative D Pumping (Continued)

ACMs
• Existing agreements include the Spring Valley Stipulation, Delamar, Dry Lake, and Cave Valley Stipulation, Conservation Agreements (least chub and Columbia spotted frog) Utah and SNWA Snake Valley Environmental Monitoring and Management Agreement (not yet completed), and Candidate Conservation Agreement/Candidate Conservation Agreement with Assurances (not yet completed). • The Spring Valley and Dry Lake, Delamar, and Cave valleys Stipulated Agreements will involve monitoring in selected springs in Spring, Snake, Delamar, Dry Lake, and Cave valleys (see Measures C.1.1 and C.1.42 in **Appendix E**). The Spring Valley Stipulated Agreement also would consider alternative withdrawal points from Shoshone Ponds. • Actions will be implemented as part of the Spring Valley and Dry Lake, Delamar, and Cave valleys Stipulated Agreements to mitigate unreasonable adverse impacts to special status species (ACM C.2.1). Specific measures related to the mitigation will be developed as part of the monitoring and mitigation planning process. This process would extend into subsequent NEPA analyses for individual basins. • ACMs would be implemented to restore and enhance habitat for federally listed or special status species and would be done in cooperation with the USFWS. These measures would restore or enhance habitat for springsnails (ACM C.2.6 and C.2.16), White River spinedace (ACM C.2.8 and C.2.17), White River springfish (ACM C.2.9), Hiko White River springfish (ACM C.2.9), Pahranagat roundtail chub (ACM C.2.9), White River speckled dace (ACM C.2.14), and northern leopard frog (ACMC.2.18).
Monitoring Recommendations
GW-MN-AB-1 (Stream Flow and Aquatic Biology Monitoring) and **GW-MN-AB-2 (Spring and Aquatic Biology Monitoring)** described for the Proposed Action, would be applied to Alternative D. Springs and streams to be considered for monitoring are provided in **Appendix F3.7**, **Tables F3.7-16** and **F3.7-17**. Streams and springs located on public lands are listed in **Table 3.3.2-9** in Water Resources. **GW-MN-AB-3 (Flow/Habitat Determination)** will be conducted in selected springs and streams to be able to determine minimum flows or water levels for critical life stages of representative fish species. As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).
Mitigation Recommendations
GW-AB-3 (Flow Change Mitigation) described for the Proposed Action, also would be applied to Alternative D. As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7). **GW-WR-5 (Shoshone Ponds Mitigation)** would avoid a conflict with management objectives for Pahrump poolfish (see Water Resources, Section 3.3, for complete wording of GW-WR-5).
Potential Residual Impacts
• The COM Plan, ACMs, and monitoring and mitigation measures could be effective in reducing impacts to aquatic habitats and species. The objectives of the COM Plan are to avoid impacts to listed species and critical habitat and avoid, minimize, or mitigate impacts to fish. However, it is not possible to determine the level of impact reduction at this time. Effects on some aquatic habitats and species could exist considering the potential long recovery period that could occur in some aquatic habitats. Some unavoidable impacts on aquatic habitat and species could occur at some locations. The magnitude of effects would be less in Snake Valley and higher in Spring Valley compared to the Proposed Action.

[1] Parameters are based on streams or springs that are located within the 10-foot drawdown contour and characterized as having moderate or high risk of pumping effects.

[2] Other streams identified by Elliott et al. (2006) (Shingle and Williams Canyon creeks in Spring Valley and Baker and Strawberry creeks in Snake Valley) would not likely be affected.

3.7.2.14 Alternative E

Groundwater Development Area

Development in Snake Valley would be eliminated. Surface disturbance could be dispersed throughout the remaining portions of Spring, Cave, Delamar, and Dry Lake basins. The effects of constructing well pads, gathering pipelines, and electrical service lines would depend upon the location of the facilities in relation to aquatic biological resources. In total, 13 perennial streams and 4 springs with aquatic biological resources occur in the groundwater development areas. A more detailed account of the resource information includes:

- Game Fish – Species occur in 13 streams in Spring Valley (**Table 3.7-1**; **Figure 3.7-3**).
- Special Status Fish – No special status fish species occur in the groundwater development areas.
- Special Status Amphibians – Northern leopard frog occurs in three springs (Blind, North Millick, and South Millick in Spring Valley) within the groundwater development areas (**Figure 3.7-5**).
- Springsnails – Toquerville pyrg (not a special status species) occurs in one spring within the groundwater development areas (unnamed spring near Cleve Creek in Spring Valley) (**Figure 3.7-5**).
- Macroinvertebrates – Species are present in all 13 perennial streams and 4 springs and waterbodies with seasonal water presence in the groundwater development area.

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-16** along with ACMs and proposed mitigation.

Table 3.7-16 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative E Groundwater Development

Effects
• Construction could alter aquatic habitat on a short-term basis in 13 perennial streams and 4 springs with aquatic biological resources. Riparian vegetation near waterbodies could be affected on a long-term basis. Surface disturbance and vehicle/equipment could affect water quality from sediment input and risks from fuel spills on a short-term basis. • Instream activities in the spring or fall could affect trout spawning on a short-term basis. • Vehicle traffic near waterbodies could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods. • Special status Bonneville cutthroat trout could be affected in one stream within the groundwater development areas (Pine/Ridge Creek in Spring Valley). • Special status amphibian species (northern leopard frog) could be affected in three springs within the groundwater development areas. • Springsnail species could be affected in spring habitats within one of the groundwater development areas (one unnamed spring in Spring Valley). • Conflicts with conservation management objectives could occur for one species: northern leopard frog (3 springs). • Game fish species considered to be traditional values to regional Tribes could be affected in Snake and Spring valleys.
COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and mitigation recommendations.
BLM RMP Direction and ACMs
• BLM RMP direction for development near springs specifies that surface water resources and associated riparian areas be maintained. • ACM B.1.1 and B.1.3 will consider the presence of special status species and their habitat in the location of production wells, collector lines, and secondary substations. • ACM B.2.1 through B.2.3 will implement permit requirements on well drilling, abandonment, drilling, and water discharge.
Proposed Mitigation
GW-AB-1 (Avoidance of springs and wetlands with special status species) and **GW-AB-2 (Establishing a 0.5-mile buffer near perennial streams with game and special status species)** as described for the Proposed Action, would be applied to Alternative E.

Table 3.7-16 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative E Groundwater Development (Continued)

Conclusions
• By avoiding springs and streams with game fish or speeial status speeies, short-term disturbance would be limited to waterbodies with seasonal flow or limited water volumes. Maeroinvertebrates likely would be present in these waterbodies. • Vehicle traffie eould cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods.
Potential Residual Impacts
• Potential amphibian mortalities from vehiele traffie near temporary and permanent waterbodies during construction.

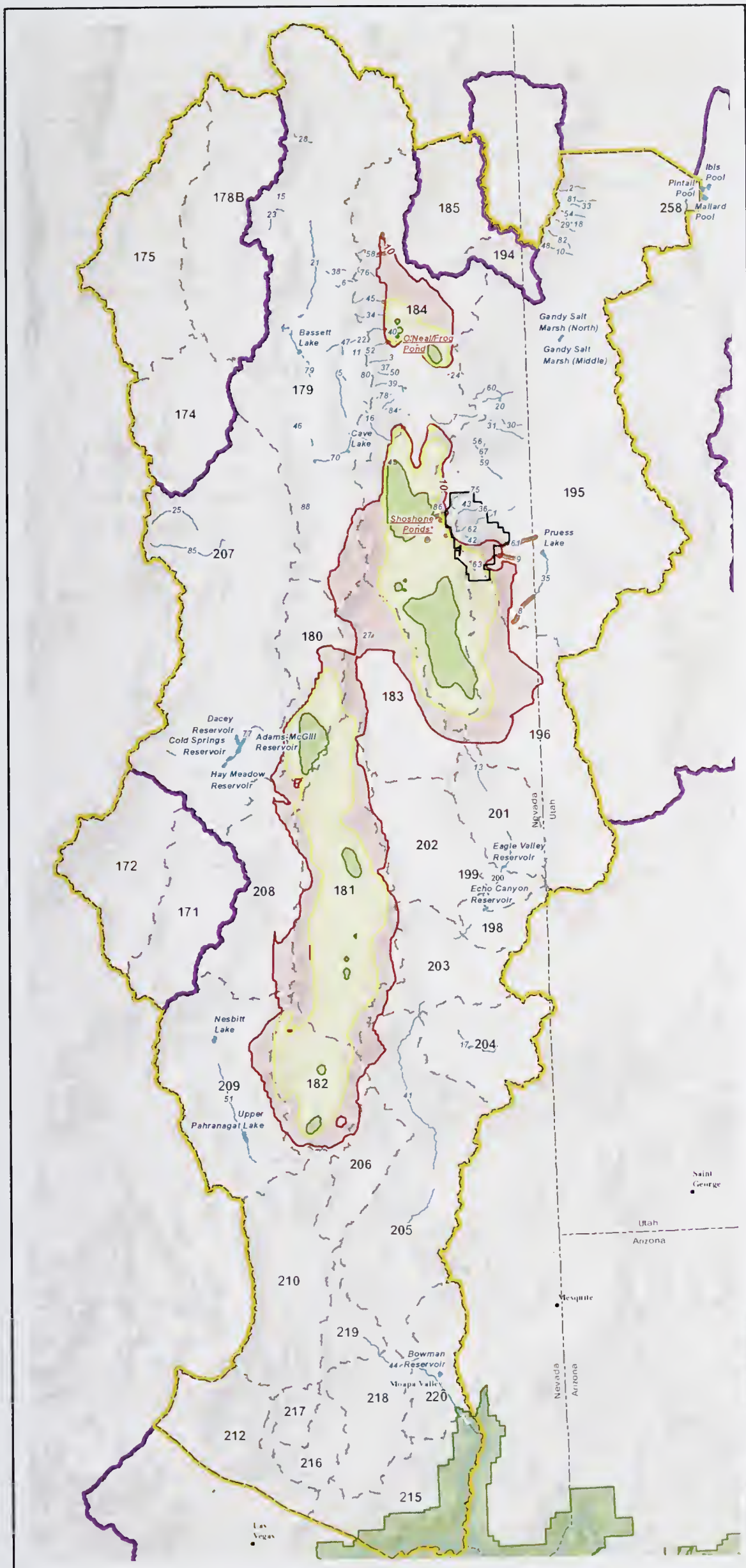
Groundwater Pumping

Alternative E would consist of reduced pumping (78,755 afy) at distributed locations in Spring, Cave, Dry Lake, and Lake valleys. No pumping would occur in Snake Valley. Alternative E pumping could result in reductions in aquatic habitat and affect aquatic species. Based on the model analysis, the predicted 10-foot drawdown contour for Alternative E pumping is shown for streams in **Figure 3.7-17** and springs in **Figure 3.7-18**. Flows could be reduced in the following number of habitats with aquatic biological resources for the three model time frames.

- Streams – 1 at full build out, 7 at full build out plus 75 years, and 15 at full build out plus 200 years; and
- Springs/Ponds/Lakes – 2 at full build out, 7 at full build out plus 75 years, and 14 at full build out plus 200 years.

Flow reductions could affect all types of aquatic communities including fish, amphibians, macroinvertebrates, macrophytes, and algae. For this EIS analysis, emphasis was placed on game fish and special status aquatic species. Alternative E could adversely affect the following game fish or special status species and their associated waterbody occurrences in at least one of the model time frames. Specific results for waterbodies and species at risk for each model time frames are provided in **Appendix F**, **Tables F3.7-22** and **F3.7-23**.

- Game Fish Streams – Geyser Creek in Lake Valley; Big Wash, Lake, and Snake creeks in Snake Valley; Bastian, Indian, Meadow, Muncy, Odgers, Pine, Ridge, Shingle, Siegel, Willard, and Williams Canyon creeks in Spring Valley.
- Game Fish Springs/Ponds/Lakes – Swallow Spring in Spring Valley.
- Federally Listed Species – White River spinedace and critical habitat in Flag Springs (White River Valley) and Pahrump poolfish in Shoshone Ponds (Spring Valley).
- Bonneville Cutthroat Trout – Stream miles at risk for flow reductions include: Pine (0.1 to 0.4 mile or 12 to 50 percent of occupied habitat in this stream), Ridge (0.6 to 1.1 miles or 50 to 92 percent of occupied habitat in this stream), Big Wash (0.8 mile or 17 percent of the occupied habitat in this stream), and Snake (<0.1 mile or <1 percent of occupied habitat in this stream).
- Other Special Status Fish Streams – Big Wash and Snake Creek in Snake Valley; and Pine and Ridge creeks in Spring Valley.
- Other Special Status Fish Springs/Ponds/Lakes – Butterfield and Flag springs in White River Valley; Keegan Spring and Shoshone Ponds in Spring Valley; and Big Springs and Stateline Springs in Snake Valley.
- Special Status Amphibian Species Springs/Ponds/Lakes – Blind, Keegan, Minerva, North Millick, South Millick, and one unnamed spring and Shoshone Ponds and O'Neal/Frog Pond in Spring Valley.
- Special Status Invertebrates Springs/Ponds/Lakes – Butterfield and Flag springs in White River Valley Big Springs in Snake Valley.



#	Stream Name
1	Baker Creek
2	Basin Creek
3	Bassett Creek
4	Bastian Creek
5	Berry Creek
6	Big Indian Creek
7	Big Negro Creek
8	Big Springs Creek
9	Big Wash
10	Birch Creek
11	Bird Creek
12	Board Creek
13	Camp Valley Creek
14	Cave Creek
15	Cherry Creek
16	Cleve Creek
17	Clover Creek
18	Cottonwood Creek
19	Deadman Creek
20	Deep Canyon Creek
21	Duck Creek
22	East Creek
23	Egan Creek
24	Eightmile Creek
25	Ellison Creek
26	Forest Home Creek
27	Geyser Creek
28	Goshute Creek
29	Granite Creek
30	Hampton Creek
31	Hendry's Creek
32	Indian Creek
33	Indian Farm Creek
34	Kalamazoo Creek
35	Lake Creek
36	Lehman Creek
37	Little Negro Creek
38	Mattier Creek
39	McCoy Creek
40	Meadow Creek
41	Meadow Valley Wash
42	Middle Fork Snake Creek
43	Mill Creek
44	Muddy River
45	Muncy Creek
46	Murry Creek
47	North Creek
48	North Fork of Birch Creek
49	North Fork Snake Creek
50	Odgers Creek
51	Pahranagat Creek
52	Piermont Creek
53	Pine Creek
54	Red Cedar Creek
55	Ridge Creek
56	Second Fork Silver Creek
57	Shingle Creek
58	Siegel Creek
59	Silver Creek
60	Smith Creek
61	Snake Creek
62	South Fork Baker Creek
63	South Fork Big Wash
64	South Fork Snake Creek
65	South Fork Willard Creek
66	South Taft Creek
67	Spring Creek (Tributary to Silver Creek)
68	Spring Creek (Tributary to Snake Creek)
69	Spring Valley Creek
70	Steptoe Creek
71	Steptoe Ranch Stream 3
72	Steptoe Ranch Stream 4a
73	Steptoe Ranch Stream 4b
74	Steptoe Ranch Stream 5
75	Strawberry Creek
76	Sunkist (North) Creek
77	Sunnyside Creek
78	Taft Creek
79	Tailings Creek
80	Timber Creek
81	Tom's Creek
82	Trout Creek
83	Upper Snake Creek
84	Vipont Creek
85	White River
86	Willard Creek
87	Williams Canyon Creek
88	Willow Creek

Underlined streams may be affected where "At Risk" stream segments intersect drawdown.

Potentially Affected "At Risk" Stream Segment

Potentially Affected "At Risk" Waterbody

Legend

Water Features Containing Sensitive Aquatic Biology or Game Fish

- Perennial Stream Reach
- Waterbody
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

* Fed by artesian well

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-17

Alternative E Drawdown and Streams/ Waterbodies with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles

0 5 10 15 20 25 50 75 Kilometers

1:2,000,000

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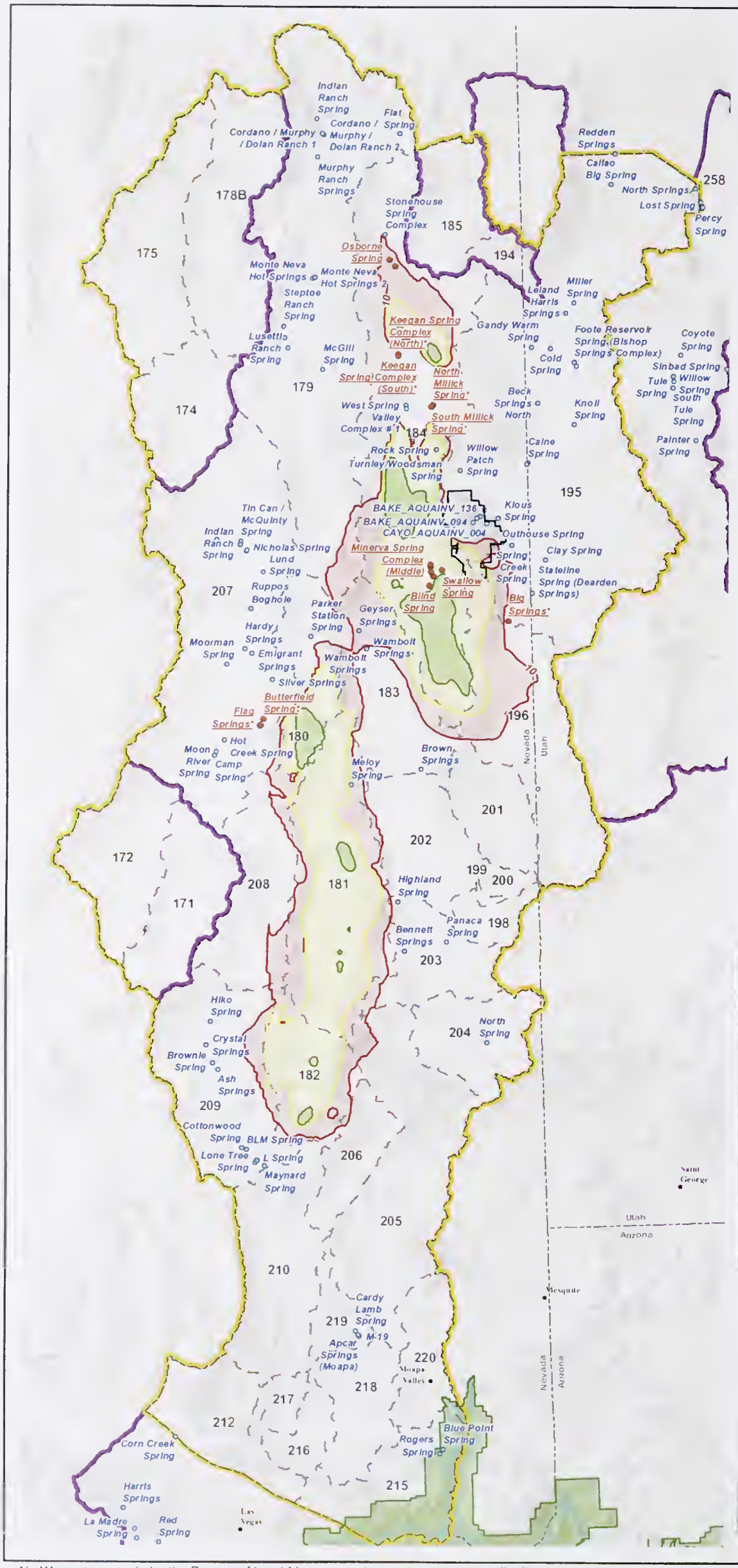
No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data



Legend

- Spring Containing Sensitive Aquatic Biology or Game Fish
- Potentially Affected Spring Containing Sensitive Aquatic Biology or Game Fish
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

*Spring is outside 10-ft drawdown contour, but model-predicted flow reductions indicate potential effect.

Basin #	Basin Name	Basin #	Basin Name
171	Coal Valley	202	Patterson Valley
172	Garden Valley	203	Panaca Valley
174	Jakes Valley	204	Clover Valley
175	Long Valley	205	Lower Meadow Valley Wash
178B	Butte Valley (Southern Part)	206	Kane Springs Valley
179	Steptoe Valley	207	White River Valley
180	Cave Valley	208	Pahroc Valley
181	Dry Lake Valley	209	Pahranagat Valley
182	Delamar Valley	210	Coyote Spring Valley
183	Lake Valley	212	Las Vegas Valley
184	Spring Valley	215	Black Mountain Area
185	Tippett Valley	216	Garnet Valley
194	Pleasant Valley	217	Hidden Valley (North)
195	Snake Valley	218	California Wash
196	Hamlin Valley	219	Muddy River Springs Area
198	Dry Valley	220	Lower Moapa Valley
199	Rose Valley	258	Fish Springs Flat
200	Eagle Valley		
201	Spring Valley		

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-18

Alternative E Drawdown and Springs with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles
0 5 10 15 20 25 50 75 Kilometers
1:2,000,000

N

No Warranty is made by the Bureau of Land Management as to the accuracy reliability, or completeness of these data for individual use or aggregate use with other data

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-17** along with ACMs and proposed mitigation.

Table 3.7-17 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative E Pumping

Effects/Conclusions
• Flow reductions would modify habitat by decreasing depths, water velocities, and wetted area in spring/pond/lake and stream habitats. A total of 15 springs/ponds/lakes and 15 streams are at risk when considering the longest model time frame. • Effects would be most pronounced in riffle habitats in streams and spring inflow and outflow areas. Effects on pool habitats would depend on the magnitude of the flow change and size of the pools. Reduced flows could adversely affect aquatic habitat by altering thermal regimes, increasing sedimentation, and reducing riparian cover. A substantial loss of habitat could occur in small springs and larger springs such as Big Springs in Snake Valley. • Flow reductions could adversely affect aquatic species by reducing abundance and diversity, altering composition, reducing food sources, limiting spawning and early life stage development, and decreasing individual health condition. • Flow reductions in 8 springs in Spring Valley could result in habitat reductions and adverse effects on the special status amphibian, northern leopard frog. • Flow reductions in Big Springs Creek and Lake Creek in Snake Valley could result in substantial loss of habitat and aquatic species. • Flow reductions in Big Springs in Snake Valley could result in loss of bifid duct and longitudinal gland pyrg populations at this location. • Due to limited occurrence (one spring/one basin), the populations of Butterfield pyrg (Butterfield Spring) and Flag pyrg (Flag Springs) could be lost if the spring habitat is substantially reduced. • Conflicts with recovery and conservation management objectives could occur for 4 species: Pahrump poolfish (Shoshone Ponds), White River spinedace (Flag Springs), Bonneville cutthroat trout (2 streams each in Spring and Snake valleys), and northern leopard frog (8 springs/ponds). • Game fish species considered to be traditional values to regional Tribes could be affected in Snake, Spring and Lake valleys.

Impact Indicators[1] By Model Time Frame	**Full Build Out**	**Full Build Out Plus 75 Years**	**Full Build Out Plus 200 Years**
Number of Hydrologic Basins at Risk with Waterbodies Containing Game Fish or Special Status Species	1	2	4
Estimated Percent Flow Reductions			
Butterfield Spring (White River Valley)	0	3	8
Flag Springs (White River Valley)	1	3	8
Keegan Spring (Spring Valley)	12	28	36
North Millick Spring (Spring Valley)	4	9	11
South Millick Spring (Spring Valley)	10	21	24
Big Springs (Snake Valley)	2	26	78
Federally Listed Species at Risk			
Pahrump poolfish	Unlikely effect	Unlikely effect	Potential effect
White River spinedace and critical habitat	Unlikely effect	Unlikely effect	Potential effect
Hiko White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
Pahranagat roundtail chub	No effect	No effect	No effect
Big Springs spinedace and critical habitat	No effect	No effect	No effect
Moapa dace	No effect	No effect	No effect
Number of Springs/Ponds/Lakes with Game or Special Status Fish Species at Risk	1	4	6
Number of Springs/Ponds/Lakes with Special Status Amphibian Species at Risk	2	6	8
Number of Springs/Ponds/Lakes with Special Status Invertebrate Species at Risk	0	1	3

Table 3.7-17 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative E Pumping (Continued)

Impact Indicators[1] By Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Small Springs (100 gpm) with Aquatic Species at Risk	0	1	5
Number of Streams with Game Fish or Special Status Species at Risk	1	7	15
Miles of Game Fish Streams at Risk	1	5	13
GBNP Springs and Streams[2] with Game Fish or Special Status Species at Risk			
Outhouse Spring	Unlikely effect	Unlikely effect	Unlikely effect
Rowland Spring	Unlikely effect	Unlikely effect	Unlikely effect
Lehman Creek	Unlikely effect	Unlikely effect	Unlikely effect
Snake Creek	Unlikely effect	Unlikely effect	<0.1 mile
Utah Springs and Streams with Game Fish or Special Status Species at Risk			
Clay Spring	Unlikely effect	Unlikely effect	Unlikely effect
Stateline Spring	Unlikely effect	Unlikely effect	Unlikely effect
Lake Creek	Unlikely effect	Unlikely effect	10.6 miles
Snake Creek	Unlikely effect	Unlikely effect	Unlikely effect
COM Plan			
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional monitoring and mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and mitigation recommendations.			
ACMs			
• Existing agreements include the Spring Valley Stipulation, Delamar, Dry Lake, and Cave Valley Stipulation, Conservation Agreements (least chub and Columbia spotted frog) Utah and SNWA Snake Valley Environmental Monitoring and Management Agreement (not yet completed), and Candidate Conservation Agreement/Candidate Conservation Agreement with Assurances (not yet completed). • The Spring Valley and Dry Lake, Delamar, Cave valleys Stipulated Agreements will involve monitoring in selected springs in Spring, Snake, Delamar, Dry Lake, and Cave valleys (see Measures C.1.1 and C.1.42 in **Appendix E**). The Spring Valley Stipulated Agreement also would consider alternative withdrawal points from Shoshone Ponds. • Actions will be implemented as part of the Spring Valley and Dry Lake, Delamar, Cave valleys Stipulated Agreements to mitigate unreasonable adverse impacts to special status species (ACM C.2.1). Specific measures related to the mitigation will be developed as part of the monitoring and mitigation planning process. This process would extend into subsequent NEPA analyses for individual basins. • ACMs would be implemented to restore and enhance habitat for federally listed or special status species and would be done in cooperation with the USFWS. These measures would restore or enhance habitat for springsnails (ACMs C.2.6 and C.2.16), White River spinedace (ACMs C.2.8 and C.2.17), White River springfish (ACM C.2.9), Hiko White River springfish (ACM C.2.9), Pahranagat roundtail chub (ACM C.2.9), White River speckled dace (ACM C.2.14), and northern leopard frog (ACMC.2.18).			
Monitoring Recommendations			
GW-MN-AB-1 (Stream Flow and Aquatic Biology Monitoring) and GW-MN-AB-2 **(Spring and Aquatic Biology Monitoring)** described for the Proposed Action, would be applied to Alternative E. Springs and streams to be considered for monitoring are provided in **Appendix F3.7**, **Tables F3.7-16** and **F3.7-17**. Streams and springs located on public lands are listed in **Table 3.3.2-9** in Water Resources. **GW-MN-AB-3 (Flow/Habitat Determination)** will be conducted in selected springs and streams to be able to determine minimum flows or water levels for critical life stages of representative fish species. As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).			

Table 3.7-17 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative E Pumping (Continued)

Mitigation Recommendations
GW-AB-3 (Flow Change Mitigation) described for the Proposed Action, also would be applied to Alternative E. As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7). **GW-WR-5 (Shoshone Ponds Mitigation)** would avoid a conflict with management objectives for Pahrump poolfish (see Water Resources, Section 3.3, for complete wording of GW-WR-5).
Potential Residual Impacts
• The COM Plan, ACMs, and monitoring and mitigation measures could be effective in reducing impacts to aquatic habitats and species. The objectives of the COM Plan are to avoid impacts to listed species and critical habitat and avoid, minimize, or mitigate impacts to fish. However, it is not possible to determine the level of impact reduction at this time. Effects on some aquatic habitats and species could exist considering the potential long recovery period that could occur in some aquatic habitats. Some unavoidable impacts on aquatic habitat and species could occur at some locations. The magnitude of effects would be less in Spring and Snake valleys compared to the Proposed Action.

[1] Parameters are based on streams or springs that are located within the 10-foot drawdown contour and characterized as having moderate or high risk of pumping effects.

[2] Other streams identified by Elliott et al. (2006) (Shingle and Williams Canyon creeks in Spring Valley and Baker and Strawberry creeks in Snake Valley) would not likely be affected.

3.7.2.15 Alternative F

Groundwater Development Area

The groundwater development areas for Alternative F would be the same as described for Alternative E, which would involve facilities in portions of Spring, Cave, Delamar, and Dry Lake basins. No development would occur in Snake Valley. The effects of constructing well pads, gathering pipelines, and electrical service lines would depend upon the location of the facilities in relation to aquatic biological resources. In total, 13 perennial streams and 4 springs with aquatic biological resources occur in the groundwater development areas. A more detailed account of the resource information includes:

- Game Fish – Species occur in 13 streams in Spring Valley (**Table 3.7-1**; **Figure 3.7-3**).
- Special Status Fish – No special status fish species occur in the groundwater development areas.
- Special Status Amphibians – Northern leopard frog occurs in three springs (Blind, North Millick, and South Millick in Spring Valley) within the groundwater development areas (**Figure 3.7-5**).
- Springsnails – Toquerville pyrg (not a special status species) occurs in one spring within the groundwater development areas (unnamed spring near Cleve Creek in Spring Valley) (**Figure 3.7-5**).
- Macroinvertebrates – Species are present in all 13 perennial streams and 4 springs and waterbodies with seasonal water presence in the groundwater development area.

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-18** along with ACMs and proposed mitigation.

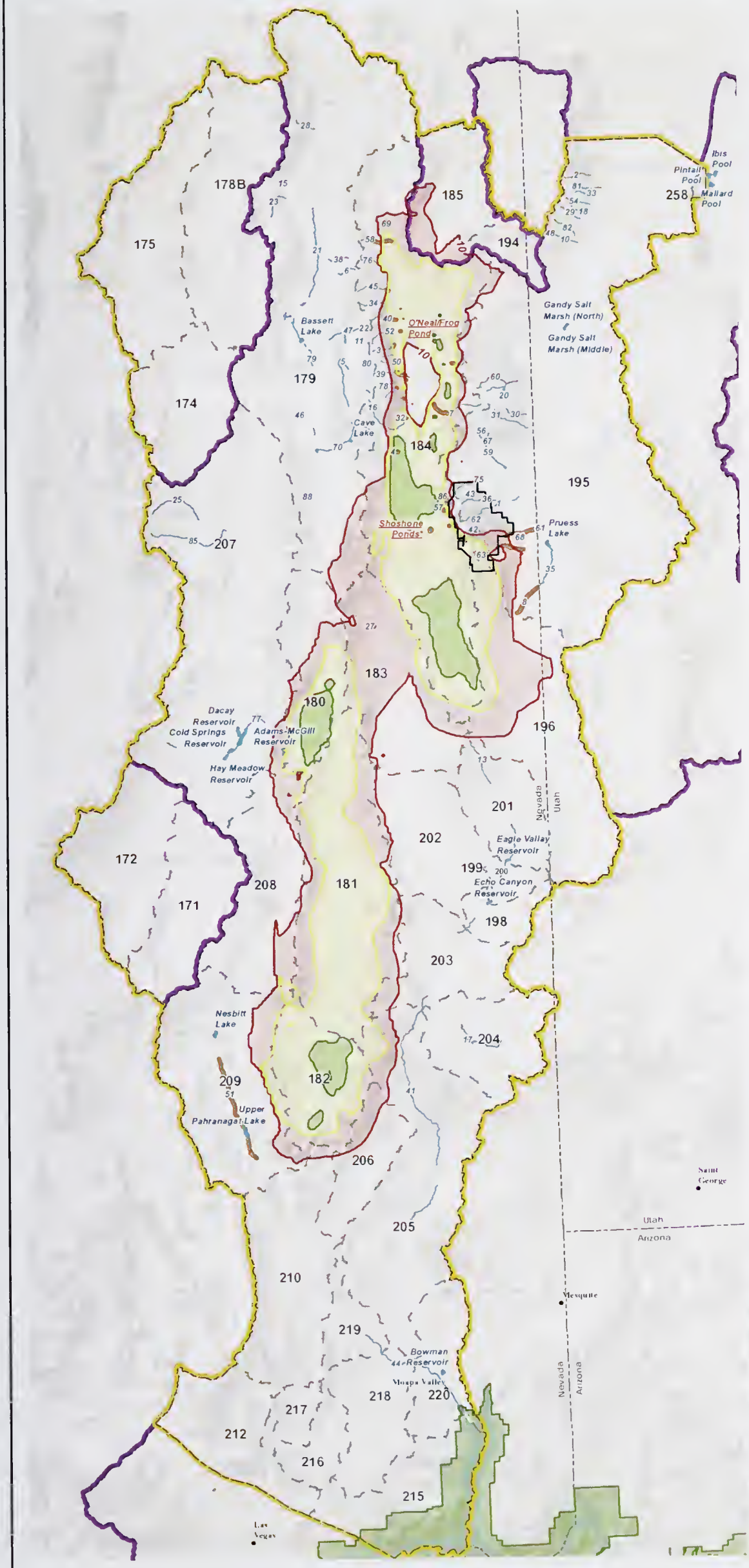
Table 3.7-18 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative F Groundwater Development

Effects
• Construction could alter aquatic habitat on a short-term basis in 13 perennial streams and 4 springs with aquatic biological resources. Riparian vegetation near waterbodies could be affected on a long-term basis. Surface disturbance and vehicle/equipment could affect water quality from sediment input and risks from fuel spills on a short-term basis. • Instream activities in the spring or fall could affect trout spawning on a short-term basis. • Vehicle traffic near waterbodies could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods. • Special status Bonneville cutthroat trout could be affected in one stream within the groundwater development areas (Pine/Ridge Creek in Spring Valley). • Special status amphibian species (northern leopard frog) could be affected in three springs within the groundwater development areas. • Springsnail species could be affected in spring habitats within one of the groundwater development areas (one unnamed spring in Spring Valley). • Conflicts with conservation management objectives could occur for one species: northern leopard frog (three springs). • Game fish species considered to be traditional values to regional Tribes could be affected in Snake and Spring valleys.
COM Plan
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and mitigation recommendations.
BLM RMP Direction and ACMs
• BLM RMP direction for development near springs specifies that surface water resources and associated riparian areas be maintained. • ACM B.1.1 and B.1.3 will consider the presence of special status species and their habitat in the location of production wells, collector lines, and secondary substations. • ACM B.2.1 through B.2.3 will implement permit requirements on well drilling, abandonment, drilling, and water discharge.
Proposed Mitigation
GW-AB-1 (Avoidance of springs and wetlands with special status species) and **GW-AB-2 (Establishing a 0.5-mile buffer near perennial streams with game and special status species)** as described for the Proposed Action, would be applied to Alternative F.
Conclusions
• By avoiding springs and streams with game fish or special status species, short-term disturbance would be limited to waterbodies with seasonal flow or limited water volumes. Macroinvertebrates likely would be present in these waterbodies. • Vehicle traffic could cause mortalities to amphibians during movement periods especially during the spring and summer breeding periods.
Potential Residual Impacts
• Potential amphibian mortalities from vehicle traffic near temporary and permanent waterbodies during construction.

Groundwater Pumping

Alternative F would consist of pumping a maximum of 114,129 afy at distributed locations in Spring, Delamar, Dry Lake, Cave, and Lake valleys. No pumping would occur in Snake Valley. Alternative F pumping could result in reductions in aquatic habitat and could adversely affect aquatic species. Based on the model analysis, the predicted 10-foot drawdown contour for Alternative F pumping is shown for streams in **Figure 3.7-19** and springs in **Figure 3.7-20**. Flows could be reduced in the following number of habitats with aquatic biological resources for the three model time frames.

- Streams – 1 at full build out, 15 at full build out plus 75 years, and 24 at full build out plus 200 years; and
- Springs/Ponds/Lakes – 2 at full build out, 13 at full build out plus 75 years, and 18 at full build out plus 200 years.



#	Stream Name
1	Baker Creek
2	Basin Creek
3	Bassett Creek
4	Bastian Creek
5	Berry Creek
6	Big Indian Creek
7	Big Negro Creek
8	Big Springs Creek
9	Big Wash
10	Birch Creek
11	Bird Creek
12	Board Creek
13	Camp Valley Creek
14	Cave Creek
15	Cherry Creek
16	Cleve Creek
17	Clover Creek
18	Cottonwood Creek
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57	Shingle Creek
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62	South Fork Baker Creek
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64	South Fork Snake Creek
65	South Fork Willard Creek
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67	Spring Creek (Tributary to Silver Creek)
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70	Steptoe Creek
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82	Trout Creek
83	Upper Snake Creek
84	Vipont Creek
85	White River
86	Willard Creek
87	Williams Canyon Creek
88	Willow Creek

Underlined streams may be affected where "At Risk" stream segments intersect drawdown.

Potentially Affected "At Risk" Stream Segment

Potentially Affected "At Risk" Waterbody

Legend

Water Features Containing Sensitive Aquatic Biology or Game Fish

- Perennial Stream Reach
- Waterbody
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

* Fed by artesian well

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-19

Alternative F Drawdown and Streams/ Waterbodies with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles

0 5 10 15 20 25 50 75 Kilometers

1:2,000,000

N

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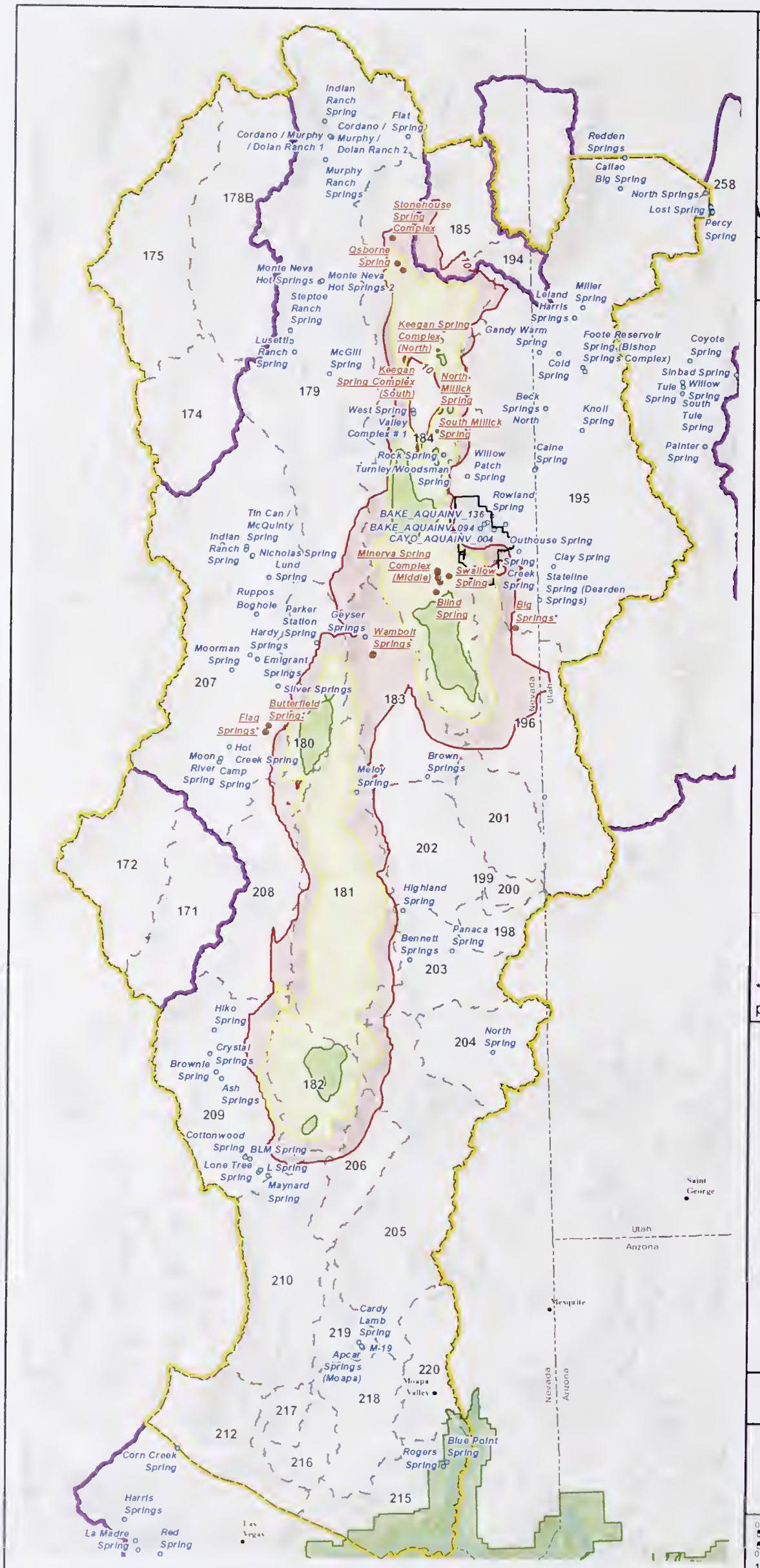

Legend

- Spring Containing Sensitive Aquatic Biology or Game Fish
- Potentially Affected Spring Containing Sensitive Aquatic Biology or Game Fish
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

*Spring is outside 10-ft drawdown contour, but model-predicted flow reductions indicate potential effect.

Basin #	Basin Name	Basin #	Basin Name
171	Coal Valley	202	Patterson Valley
172	Garden Valley	203	Panaca Valley
174	Jakes Valley	204	Clover Valley
175	Long Valley	205	Lower Meadow Valley Wash
178B	Butte Valley (Southern Part)	206	Kane Springs Valley
179	Steptoe Valley	207	White River Valley
180	Cave Valley	208	Pahroc Valley
181	Dry Lake Valley	209	Pahranagat Valley
182	Delamar Valley	210	Coyote Spring Valley
183	Lake Valley	212	Las Vegas Valley
184	Spring Valley	215	Black Mountain Area
185	Tippett Valley	216	Garnet Valley
194	Pleasant Valley	217	Hidden Valley (North)
195	Snake Valley	218	California Wash
196	Hamlin Valley	219	Muddy River Springs Area
198	Dry Valley	220	Lower Moapa Valley
199	Rose Valley	258	Fish Springs Flat
200	Eagle Valley		
201	Spring Valley		

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-20

Alternative F Drawdown and Springs with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles
0 5 10 15 20 25 50 75 Kilometers
1:2,000,000

N

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Flow reductions could affect all types of aquatic communities including fish, amphibians, macroinvertebrates, macrophytes, and algae. For this EIS analysis, emphasis was placed on game fish and special status aquatic species. Alternative F could adversely affect the following game fish or special status species and their associated waterbody occurrences in at least one of the model time frames. Specific results for waterbodies and species at risk for each model time frames are provided in **Appendix F**, **Tables F3.7-24** and **F3.7-25**. Impact results organized by special status species also are listed in **Appendix F**, **Table F3.7-13A**, (Fish), **Table F3.7-13B** (Amphibians), and **Table F3.7-13C**, (Invertebrates).

- Game Fish Streams – Geyser Creek in Lake Valley; Big Wash Lake, and Snake creeks in Snake Valley; Bastian, Bassett, Eightmile, Indian, McCoy, Meadow, Muncy, Negro, Odgers, Piermont, Pine, Ridge, Shingle, Siegel, South Taft, Taft, Vipont, Willard, and Williams Canyon creeks in Spring Valley.
- Game Fish Springs/Ponds/Lakes – Swallow Spring in Spring Valley.
- Federally Listed Species – White River spinedace and critical habitat in Flag Springs (White River Valley) and Pahrump poolfish in Shoshone Ponds (Spring Valley).
- Bonneville Cutthroat Trout – Stream miles at risk for flow reductions include: Pine (0.1 to 0.4 mile or 12 to 50 percent of occupied habitat in this stream), Ridge (0.6 to 1.1 miles or 50 to 92 percent of occupied habitat in this stream), Big Wash (2.8 miles or 50 percent of occupied habitat in this stream) and Snake (<0.1 mile or <1 percent of occupied habitat in this stream).
- Other Special Status Fish Streams – Big Wash and Snake Creek in Snake Valley; and Pine and Ridge creeks in Spring Valley.
- Other Special Status Fish Springs/Ponds/Lakes – Butterfield and Flag springs in White River Valley; Keegan and Stonehouse springs and Shoshone Ponds in Spring Valley; and Big Springs and Stateline Springs in Snake Valley.
- Special Status Amphibian Species Springs/Ponds/Lakes – Blind, Cleveland Ranch, Keegan, Minerva, North Millick, South Millick, and one unnamed spring and Shoshone Ponds and O'Neal/Frog Pond in Spring Valley; and Wambolt Spring in Lake Valley.

Special Status Invertebrates Springs/Ponds/Lakes – Butterfield and Flag springs in White River Valley, Big Springs in Snake Valley, and Wambolt Spring in Lake Valley.The effects and conclusions of Alternative F groundwater pumping on aquatic biological resources are provided in **Table 3.7-19** along with ACMs and proposed mitigation.

Table 3.7-19 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative F Pumping

Effects/Conclusions
• Flow reductions would modify habitat by decreasing depths, water velocities, and wetted area in spring/pond/lake and stream habitats. A total of 18 springs/ponds/lakes and 24 streams are at risk when considering the longest model time frame. • Effects would be most pronounced in riffle habitats in streams and spring inflow and outflow areas. Effects on pool habitats would depend on the magnitude of the flow change and size of the pools. Reduced flows could adversely affect aquatic habitat by altering thermal regimes, increasing sedimentation, and reducing riparian cover. A substantial loss of habitat could occur in small springs and larger springs such as Big Springs in Snake Valley. • Flow reductions could adversely affect aquatic species by reducing abundance and diversity, altering composition, reducing food sources, limiting spawning and early life stage development, and decreasing individual health condition. • Flow reductions in 11 springs in Spring Valley could result in habitat reductions and adverse effects on the special status amphibian, northern leopard frog. • Flow reductions in Big Springs Creek and Lake Creek in Snake Valley could result in substantial loss of habitat and aquatic species. • Flow reductions in Big Springs in Snake Valley could result in loss of bifid duct and longitudinal gland pyrg populations at this location. • Due to limited occurrence (one spring/one basin), the populations of Butterfield pyrg (Butterfield Spring) and Flag pyrg (Flag Springs) could be lost if the spring habitat is substantially reduced. • Conflicts with recovery and conservation management objectives could occur for 4 species: Pahrump poolfish (Shoshone Ponds), White River spinedace (Flag Springs), Bonneville cutthroat trout (2 streams each in Spring and Snake valleys), and northern leopard frog (10 springs/ponds). • Game fish species considered to be traditional values to regional Tribes could be affected in Snake, Spring, and Lake valleys.

Table 3.7-19 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative F Pumping (Continued)

Impact Indicators[1] By Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Hydrologic Basins at Risk with Waterbodies Containing Game Fish or Special Status Species	1	2	5
Estimated Percent Flow Reductions			
Butterfield Spring (White River Valley)	1	6	17
Flag Springs (White River Valley)	1	6	16
Keegan Spring (Spring Valley)	35	98	100
North Millick Spring (Spring Valley)	20	52	60
South Millick Spring (Spring Valley)	36	86	95
Big Springs (Snake Valley)	2	25	83
Federally Listed Species at Risk			
Pahrump poolfish	Unlikely effect	Potential effect	Potential effect
White River spinedace and critical habitat	Unlikely effect	Unlikely effect	Potential effect
Hiko White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
White River springfish and critical habitat	Unlikely effect	Unlikely effect	Unlikely effect
Pahranagat roundtail chub	No effect	No effect	No effect
Big Springs spinedace and critical habitat	No effect	Unlikely effect	Unlikely effect
Moapa dace	No effect	No effect	Unlikely effect
Number of Springs/Ponds/Lakes with Game or Special Status Fish Species at Risk	1	5	7
Number of Springs/Ponds/Lakes with Special Status Amphibian Species at Risk	2	8	10
Number of Springs/Ponds/Lakes with Special Status Invertebrate Species at Risk	0	1	4
Number of Small Springs (100 gpm) with Aquatic Species at Risk	0	5	8
Number of Streams with Game Fish or Special Status Species at Risk	1	15	25
Miles of Game Fish Streams at Risk	1	16	28
GBNP Springs and Streams[2] with Game Fish or Special Status Species at Risk			
Outhouse Spring	Unlikely effect	Unlikely effect	Unlikely effect
Rowland Spring	Unlikely effect	Unlikely effect	Unlikely effect
Lehman Creek	Unlikely effect	Unlikely effect	Unlikely effect
Snake Creek	Unlikely effect	Unlikely effect	0.8 mile
Utah Springs and Streams with Game Fish or Special Status Species at Risk			
Clay Spring	Unlikely effect	Unlikely effect	Unlikely effect
Stateline Spring	Unlikely effect	Unlikely effect	Unlikely effect
Lake Creek	Unlikely effect	Unlikely effect	10.6 miles
Snake Creek	Unlikely effect	Unlikely effect	Unlikely effect
COM Plan			
• The COM Plan for designing and implementing monitoring and mitigation would integrate protective measures from the BLM RMP Management Actions and BMPs, BO, ACMs, Stipulated Agreements, and additional monitoring and mitigation are summarized below. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary. Protective measures for aquatic resources are summarized below for ACMs and mitigation recommendations.			

Table 3.7-19 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for Alternative F Pumping (Continued)

ACMs

- Existing agreements include the Spring Valley Stipulation, Delamar, Dry Lake, and Cave Valley Stipulation, Conservation Agreements (least chub and Columbia spotted frog) Utah and SNWA Snake Valley Environmental Monitoring and Management Agreement (not yet completed), and Candidate Conservation Agreement/Candidate Conservation Agreement with Assurances (not yet completed).
- The Spring Valley and Dry Lake, Delamar, and Cave valleys Stipulated Agreements will involve monitoring in selected springs in Spring, Snake, Delamar, Dry Lake, and Cave valleys (see Measures C.1.1 and C.1.42 in **Appendix E**). The Spring Valley Stipulated Agreement also would consider alternative withdrawal points from Shoshone Ponds.
- Actions will be implemented as part of the Spring Valley and Dry Lake, Delamar, and Cave valleys Stipulated Agreements to mitigate unreasonable adverse impaets to special status species (ACM C.2.1). Specific measures related to the mitigation will be developed as part of the monitoring and mitigation planning process. This process would extend into subsequent NEPA analyses for individual basins.
- ACMs would be implemented to restore and enhance habitat for federally listed or special status species and would be done in cooperation with the USFWS. These measures would restore or enhance habitat for springsnails (ACM C.2.6 and C.2.16), White River spinedace (ACM C.2.8 and C.2.17), White River springfish (ACM C.2.9), Hiko White River springfish (ACM C.2.9), Pahranagat roundtail chub (ACM C.2.9), White River speckled dace (ACM C.2.14), and northern leopard frog (ACMC.2.18).

Monitoring Recommendations

GW-MN-AB-1 (Stream Flow and Aquatic Biology Monitoring) and **GW-MN-AB-2 (Spring and Aquatic Biology Monitoring)** described for the Proposed Action, would be applied to Alternative F. Springs and streams to be considered for monitoring are provided in **Appendix F3.7**, **Tables F3.7-16** and **F3.7-17**. Streams and springs located on public lands are listed in **Table 3.3.2-9** in Water Resources.

GW-MN-AB-3 (Flow/Habitat Determination) will be conducted in selected springs and streams to be able to determine minimum flows or water levels for eritical life stages of representative fish species.

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as eritical to providing early warning of potential effeets to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

Mitigation Recommendations

GW-AB-3 (Flow Change Mitigation) described for the Proposed Action, also would be applied to Alternative F.

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

GW-WR-5 (Shoshone Ponds Mitigation) would avoid a conflict with management objectives for Pahrump poolfish (see Water Resources, Section 3.3, for complete wording of GW-WR-5).

Potential Residual Impacts

- The COM Plan, ACMs, and monitoring and mitigation measures could be effective in reducing impacts to aquatic habitats and species. The objectives of the COM Plan are to avoid impacts to listed species and critical habitat and avoid, minimize, or mitigate impacts to fish. However, it is not possible to determine the level of impact reduction at this time. Effects on some aquatic habitats and species could exist considering the potential long recovery period that could occur in some aquatic habitats. Some unavoidable impacts on aquatic habitat and species could occur at some locations. The magnitude of effects would be less in Spring and Snake valleys compared to the Proposed Action.

[1] Parameters are based on streams or springs that are located within the 10-foot drawdown contour and characterized as having moderate or high risk of pumping effects.

[2] Other streams identified by Elliott et al. (2006) (Shingle and Williams Canyon creeks in Spring Valley and Baker and Strawberry creeks in Snake Valley) would not likely be affected.

3.7.2.16 No Action

Groundwater Development Area

Under the No Action Alternative, no groundwater activities would occur in the five pumping basins. Therefore, aquatic biological resources would not be affected by surface disturbance or facility maintenance activities.

Groundwater Pumping

No Action pumping could result in reductions in aquatic habitat and affect aquatic species. Based on the model analysis, the predicted 10-foot drawdown contour for No Action pumping is shown for streams in **Figure 3.7-21** and springs in **Figure 3.7-22**. Flows could be reduced in the following number of habitats with aquatic biological resources for the three model time frames.

- Streams – 2 at full build out, 3 at full build out plus 75 years, and 7 at full build out plus 200 years; and
- Springs/Ponds/Lakes – 3 at full build out, 7 at full build out plus 75 years, and 10 at full build out plus 200 years.

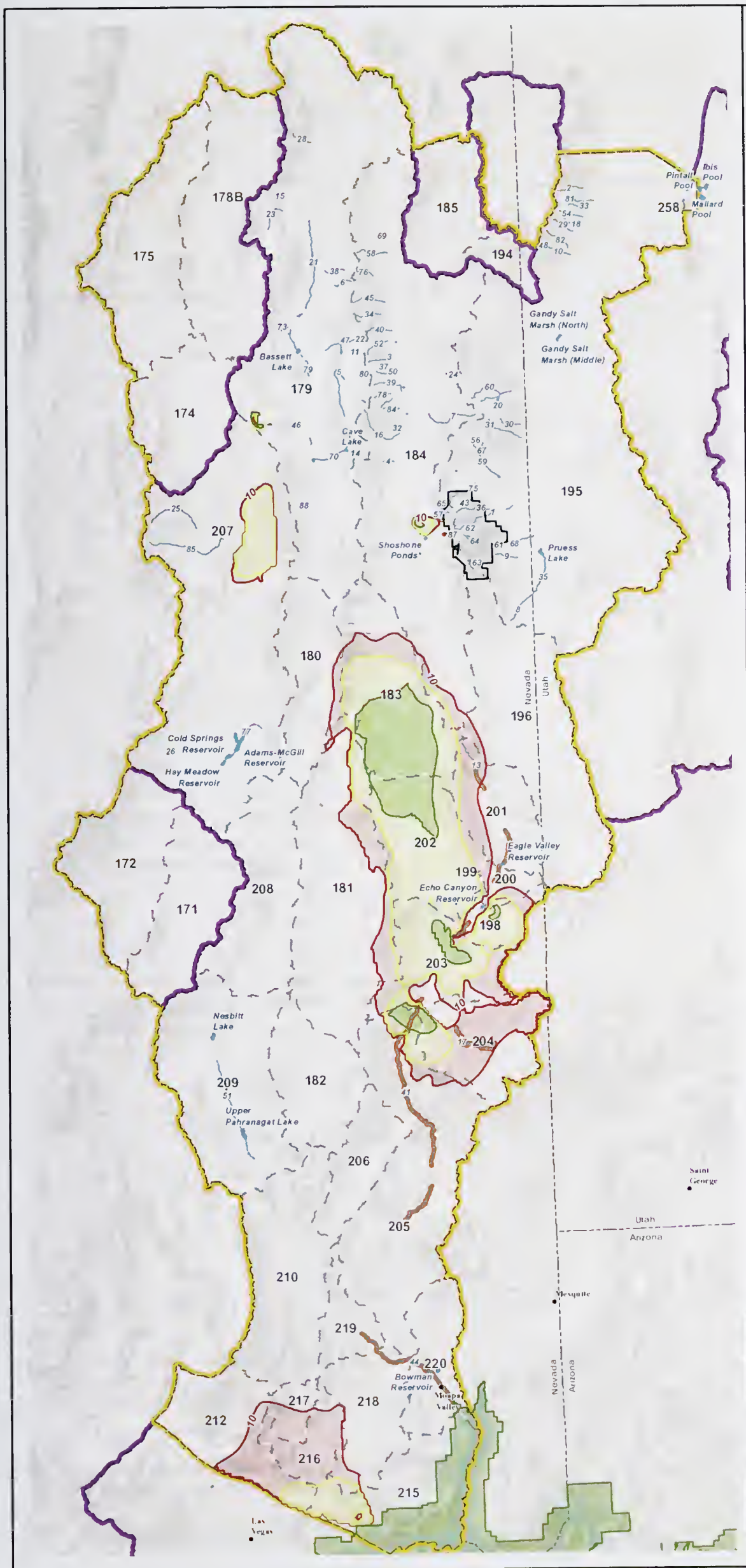
Flow reductions could affect all types of aquatic communities including fish, amphibians, macroinvertebrates, macrophytes, and algae. For this EIS analysis, emphasis was placed on game fish and special status aquatic species. No Action could adversely affect the following game fish or special status species and their associated waterbody occurrences in at least one of the model time frames. Specific results for waterbodies and species at risk for each model time frames are provided in **Appendix F**, **Tables F3.7-26** and **F3.7-27**.

- Game Fish Streams – Ridge and Williams Canyon creeks in Spring Valley (#184); Clover Creek in Clover Valley; Meadow Valley Wash (Lower Meadow Valley Wash); and Camp Valley Creek in Spring Valley (#201).
- Game Fish Springs/Ponds/Lakes – none.
- Federally Listed Species – Flag Springs (White River spinedace) in White River Valley, Shoshone Ponds (Pahrump poolfish) in Spring Valley, and Moapa dace in the Muddy River (Muddy River Springs Area).
- Other Special Status Fish Streams – Clover Creek in Clover Valley and Meadow Valley Wash (Lower Meadow Valley Wash and Panaca Valley).
- Other Special Status Fish Springs/Ponds/Lakes – Arnoldson, Indian Ranch, Nicolas, and Preston Big springs in White River Valley.
- Special Status Amphibian Species Springs/Ponds/Lakes –Wambolt Spring in Lake Valley.
- Special Status Invertebrates Springs/Ponds/Lakes – Arnoldson, Indian Ranch, Nicolas, and Preston Big springs in White River Valley; an unnamed spring near Camp Creek in Spring Valley (#201), and Wambolt Spring in Lake Valley.

The effects and conclusions of groundwater development on aquatic biological resources are provided in **Table 3.7-20** along with ACMs and proposed mitigation.

3.7.2.17 Alternatives Comparison

Impact parameter information for aquatic biological resources was tabulated for all action alternatives for the purpose of comparing pumping effects (**Table 3.7-21**). Impact parameters provide a quantitative indication of effects on aquatic habitat or species groups. A visual comparison of the impact parameter information also is shown in **Figure 3.7-23**. Information in **Figure 3.7-23** focuses on those parameters that show a noticeable difference amongst the alternatives.



#	Stream Name
1	Baker Creek
2	Basin Creek
3	Bassett Creek
4	Bastian Creek
5	Berry Creek
6	Big Indian Creek
7	Big Negro Creek
8	Big Springs Creek
9	Big Wash
10	Birch Creek
11	Bird Creek
12	Board Creek
13	Camp Valley Creek
14	Cave Creek
15	Cherry Creek
16	Cleve Creek
17	Clover Creek
18	Cottonwood Creek
19	Deadman Creek
20	Deep Canyon Creek
21	Duck Creek
22	East Creek
23	Egan Creek
24	Eightmile Creek
25	Ellison Creek
26	Forest Home Creek
27	Geyser Creek
28	Goshute Creek
29	Granite Creek
30	Hampton Creek
31	Hendry's Creek
32	Indian Creek
33	Indian Farm Creek
34	Kalamazoo Creek
35	Lake Creek
36	Lehman Creek
37	Little Negro Creek
38	Mattier Creek
39	McCoy Creek
40	Meadow Creek
41	Meadow Valley Wash
42	Middle Fork Snake Creek
43	Mill Creek
44	Muddy River
45	Muncy Creek
46	Murry Creek
47	North Creek
48	North Fork of Birch Creek
49	North Fork Snake Creek
50	Odgers Creek
51	Pahranagat Creek
52	Piermont Creek
53	Pine Creek
54	Red Cedar Creek
55	Ridge Creek
56	Second Fork Silver Creek
57	Shingle Creek
58	Siegel Creek
59	Silver Creek
60	Smith Creek
61	Snake Creek
62	South Fork Baker Creek
63	South Fork Big Wash
64	South Fork Snake Creek
65	South Fork Willard Creek
66	South Taft Creek
67	Spring Creek (Tributary to Silver Creek)
68	Spring Creek (Tributary to Snake Creek)
69	Spring Valley Creek
70	Steptoe Creek
71	Steptoe Ranch Stream 3
72	Steptoe Ranch Stream 4a
73	Steptoe Ranch Stream 4b
74	Steptoe Ranch Stream 5
75	Strawberry Creek
76	Sunkist (North) Creek
77	Sunnyside Creek
78	Taft Creek
79	Tailings Creek
80	Timber Creek
81	Tom's Creek
82	Trout Creek
83	Upper Snake Creek
84	Vipont Creek
85	White River
86	Willard Creek
87	Williams Canyon Creek
88	Willow Creek

Underlined streams may be affected where "At Risk" stream segments intersect drawdown.

Potentially Affected "At Risk" Stream Segment

Potentially Affected "At Risk" Waterbody

Legend

Water Features Containing Sensitive Aquatic Biology or Game Fish

- Perennial Stream Reach
- Waterbody
- Water Resources Region of Study
- Natural Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

* Fed by artesian well

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-21

No Action Drawdown and Streams/ Waterbodies with Aquatic Biological Resources

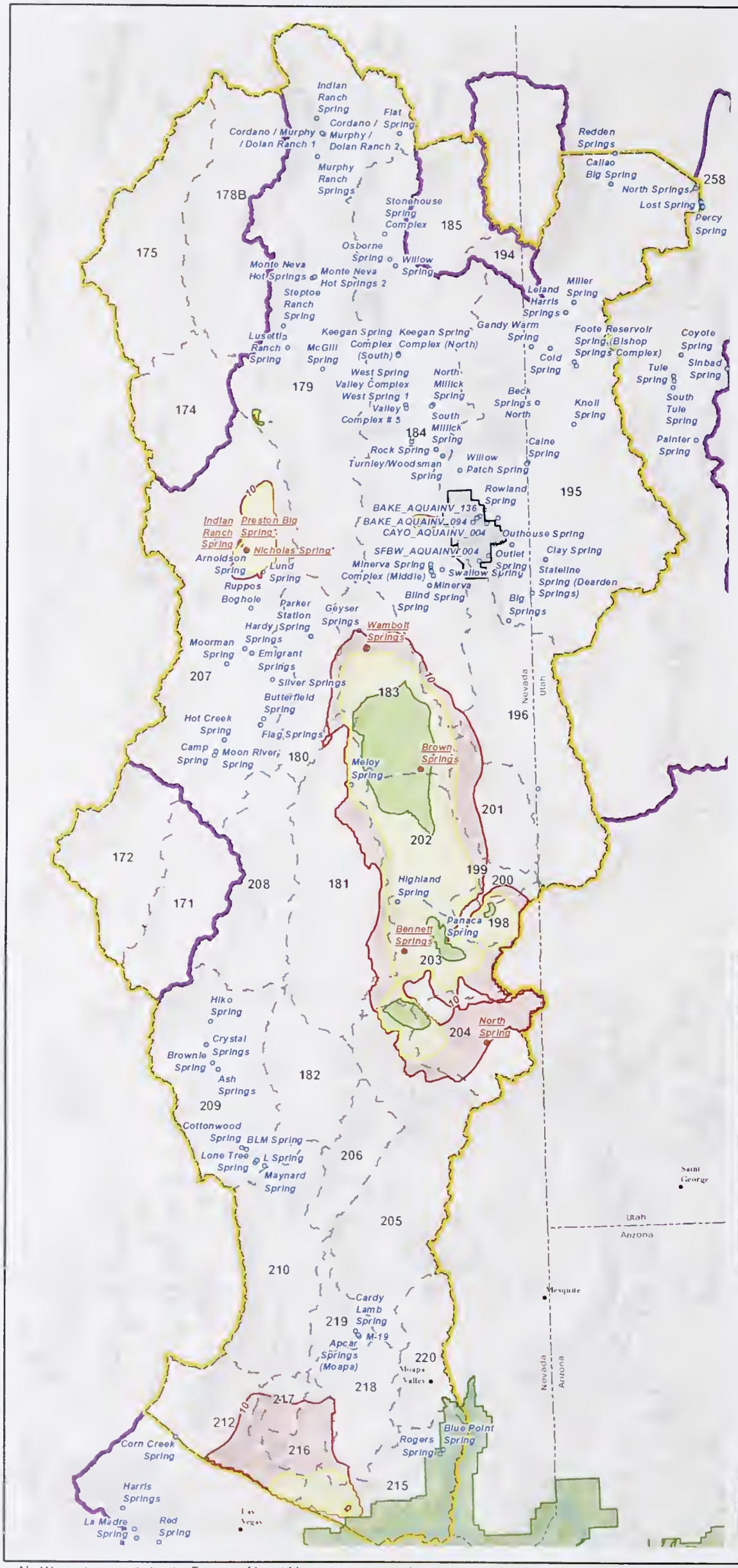
0 5 10 15 20 25 50 Miles

0 5 10 15 20 25 50 75 Kilometers

1:2,000,000

N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data



Legend

- Spring Containing Sensitive Aquatic Biology or Game Fish
- Potentially Affected Spring Containing Sensitive Aquatic Biology or Game Fish
- Water Resources Region of Study
- Hydrographic Basin
- Natural Resources Region of Study
- Great Basin National Park
- Lake Mead National Recreation Area
- 10 ft . Drawdown (Full Build Out)
- 10 ft. Drawdown (Full Build Out + 75 Years)
- 10 ft. Drawdown (Full Build Out + 200 Years)

*Spring is outside 10-ft drawdown contour, but model-predicted flow reductions indicate potential effect.

Basin #	Basin Name	Basin #	Basin Name
171	Coal Valley	202	Patterson Valley
172	Garden Valley	203	Panaca Valley
174	Jakes Valley	204	Clover Valley
175	Long Valley	205	Lower Meadow Valley Wash
178B	Butte Valley (Southern Part)	206	Kane Springs Valley
179	Steptoe Valley	207	White River Valley
180	Cave Valley	208	Pahroc Valley
181	Dry Lake Valley	209	Pahranagat Valley
182	Delamar Valley	210	Coyote Spring Valley
183	Lake Valley	212	Las Vegas Valley
184	Spring Valley	215	Black Mountain Area
185	Tippett Valley	216	Garnet Valley
194	Pleasant Valley	217	Hidden Valley (North)
195	Snake Valley	218	California Wash
196	Hamlin Valley	219	Muddy River Springs Area
198	Dry Valley	220	Lower Moapa Valley
199	Rose Valley	258	Fish Springs Flat
200	Eagle Valley		
201	Spring Valley		

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.7-22

No Action Drawdown and Springs with Aquatic Biological Resources

0 5 10 15 20 25 50 Miles
0 5 10 15 20 25 50 75 Kilometers
1:2,000,000

N

No Warranty is made by the Bureau of Land Management as to the accuracy reliability, or completeness of these data for individual use or aggregate use with other data

Table 3.7-20 Summary of Aquatic Biological Resource Impacts, ACMs, and Monitoring and Mitigation Recommendations for No Action Pumping

Effects/Conclusions

- Flow reductions would modify habitat by dcercasing depths, water velocities, and wetted area in spring/pond/lake and stream habitats. A total of nine springs/ponds/lakes and seven streams are at risk when considering the longest model time framc.
- Effects would be most pronounced in riffle habitats in streams and spring inflow and outflow areas. Effects on pool habitats would depend on the magnitude of the flow change and size of the pools. Reduced flows could adversely affeet aquatic habitat by altering thermal regimes, inereasing sedimentation, and reducing riparian cover. A complete loss of habitat could occur in small springs.
- Due to limited distribution (one spring/one basin), the population of Lake Valley pyrg (Wambolt Spring) in Lakc Valley and Camp Valley pyrg (unnamed spring near Camp Valley Creek in Spring Valley [#201]) could be lost if flow is substantially reduced.
- Flow reductions could adversely affeet aquatie species by reducing abundance and diversity, altering composition, reducing food sourees, limiting spawning and early life stage development, and decreasing individual health condition.
- Conflicts with recovery and conservation management objectives could occur for four species: Pahrump poolfish (Shoshone Ponds), White River springfish (Flag Springs), Bonneville cutthroat trout (Ridge Creek in Spring Valley), and northern leopard frog (one spring).
- Game fish speeies considered to be traditional values to regional Tribes could be affected in Snake, Spring (#184 and 201), Clover, Panaca, and Lower Meadow Valley Wash.

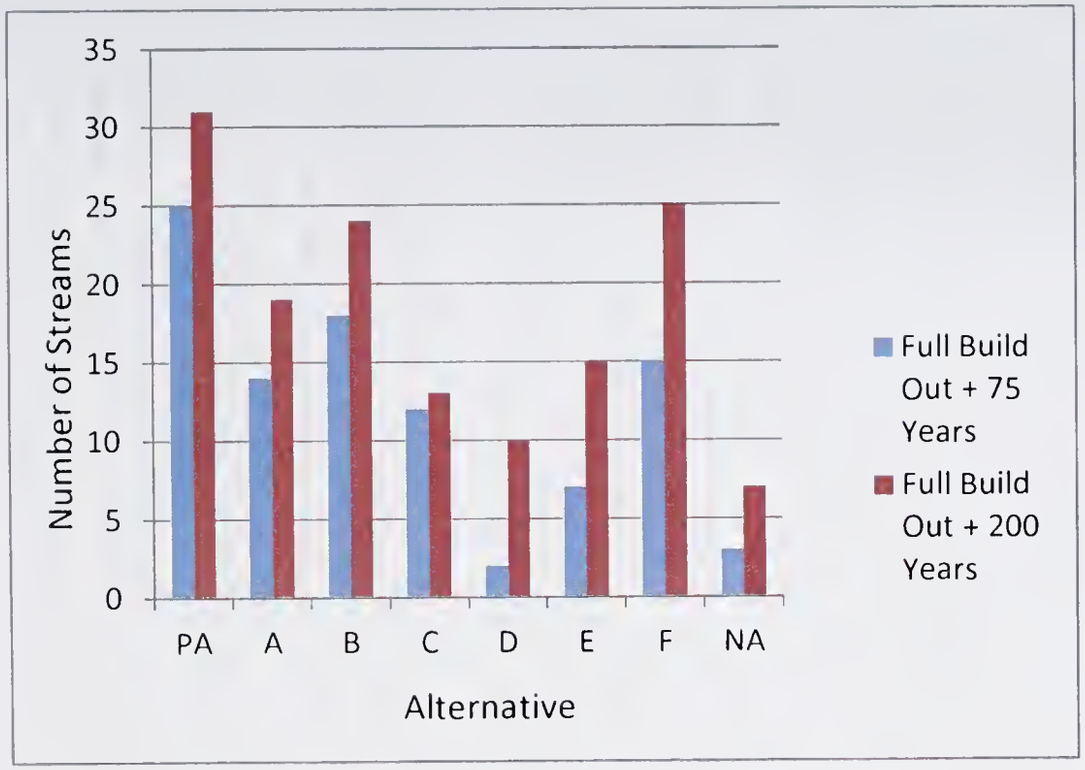
Impact Indicators[1] By Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Hydrologic Basins at Risk with Waterbodies Containing Game Fish or Special Status Speeies	4	5	7
Estimated Percent Flow Reduetions			
Arnoldson Spring (White River Valley)	4	6	8
Butterfield Spring (White River Valley)	0	1	3
Flag Springs (White River Valley)	0	1	3
Nicolas Spring (White River Valley)	5	7	9
Preston Big Springs (White River Valley)	2	5	7
Keegan Spring (Spring Valley)	2	2	2
North Millick Spring (Spring Valley)	0	0	0
South Millick Spring (Spring Valley)	1	1	1
Big Springs (Snake Valley)	9	13	16
Muddy River near Moapa (Muddy Springs Area)	4	6	9
Federally Listed Species at Risk Pahrump poolfish White River spinedace Moapa dace	 No effect Unlikely effect Unlikely effect	 No effect Potential effcct Potential effcct	 No cffect Potential effcct Potential effeet
Number of Springs/Ponds/Lakes with Game or Special Status Fish Species at Risk	2	5	5
Number of Springs/Ponds/Lakes with Speeial Status Amphibian Species at Risk	0	0	1
Number of Springs/Ponds/Lakes with Special Status Invertebrate Speeies at Risk	2	4	6
Number of Small Springs (100 gpm) with Aquatic Species at Risk	1	1	2
Number of Streams with Game Fish or Spccial Status Species at Risk	2	3	7
Miles of Game Fish Streams at Risk	5	6	26
GBNP Springs and Streams with Game Fish or Special Status Specics at Risk	No Effect	No effect	No effect
Utah Springs and Streams with Game Fish or Special Status Species at Risk	No Effect	No effect	No effect

[1] Parameters are based on streams or springs that are located within the 10-foot drawdown contour and characterizcd as having moderate or high risk of pumping effects.

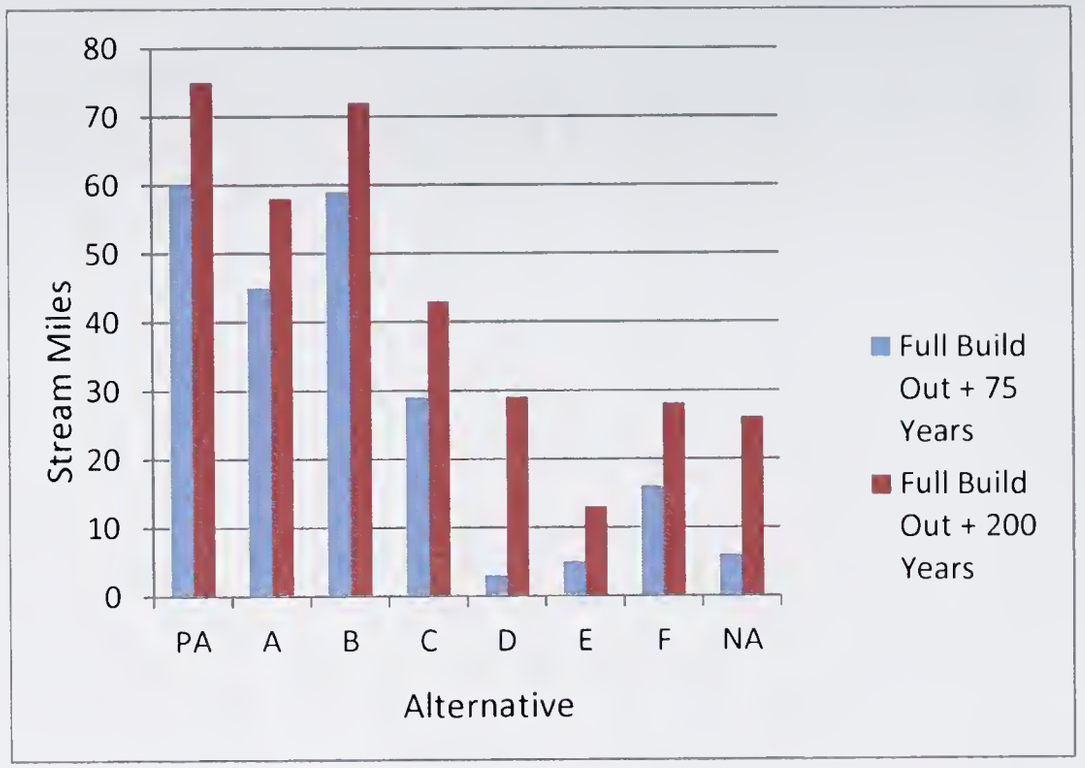
Table 3.7-21 Summary of Aquatic Biology Impact Parameters to Compare Groundwater Pumping Effects for the Proposed Action, Alternatives A through F, and No Action[1]

Impact Information	Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	No Action
Impact Indicators								
Miles of Game Fish and Special Status Species Streams with Potential Flow Reductions (three model periods)	6, 60, and 75	3, 45, and 58	3, 59, and 72	1, 29, and 43	0, 3, and 29	1, 5, and 13	1, 16, and 28	5, 6, and 26
Number of Streams with Game Fish or Special Status Species Potentially Affected (three model periods)	4, 25, and 31	2, 14, and 19	3, 18, and 24	1, 12, and 13	0, 2, and 10	1, 7, and 15	1, 15, and 25	2, 3, and 7
Number of Springs/Ponds/Lakes Containing Game and Special Status Fish Species with Potential Water Level Reductions (three model periods)	1, 9, and 11	2, 8, and 10	4, 10, and 14	1, 7, and 9	1, 2, and 5	1, 4, and 6	1, 5, and 7	2, 5, and 5
Number of Springs/Ponds/Lakes Containing Special Status Amphibian Species with Potential Water Level Reductions (three model periods)	3, 9, and 10	2, 6, and 9	3, 8, and 10	2, 4, and 6	0, 2, and 4	2, 6, and 8	2, 8, and 10	0, 0, and 1
Number of Springs/Ponds/Lakes Containing Special Status Invertebrate Species with Potential Water Level Reductions (three model periods)	0, 7, and 8	0, 5, and 8	3, 7, and 10	0, 5, and 5	1, 2, and 6	0, 1, and 3	0, 1, and 4	2, 4, and 6
Number of Small Springs (< 100 gpm) with Aquatic Species in Drawdown Area with Potential Flow Reductions (three model periods)	0, 13, and 15	0, 7, and 12	2, 9, and 13	0, 3, and 6	0, 1, and 5	0, 1, and 5	0, 5, and 8	1, 1, and 2
Number of Springs with Aquatic Biological Importance Potentially Affected within GBNP (three model periods)	0, 1, and 2	0, 1, and 2	0, 2, and 2	0, 0, and 1	0, 0, and 1	0, 0, and 0	0, 0, and 0	0, 0, and 0
Stream Miles in GBNP with Aquatic Biological Importance Potentially Affected (three model periods)	0, 2, and 2	0, 2, and 2	0, 5, and 6	0, 0, and 2	0, 0, and 2	0, 0, and <1	0, 0, and <1	0, 0, and 0
Number of Springs with Aquatic Biological Importance Potentially Affected within Utah (three model periods)	0, 3, and 3	0, 3, and 3	0, 2, and 2	0, 3, and 3	0, 0, and 0	0, 0, and 0	0, 0, and 0	0, 0, and 0
Stream Miles in Utah with Aquatic Biological Importance Potentially Affected (three model periods)	0, 12, and 12	0, 12, and 12	0, 11, and 11	0, 12, and 12	0, 0, and 11	0, 0, and 11	0, 0, and 11	0, 0, and 0

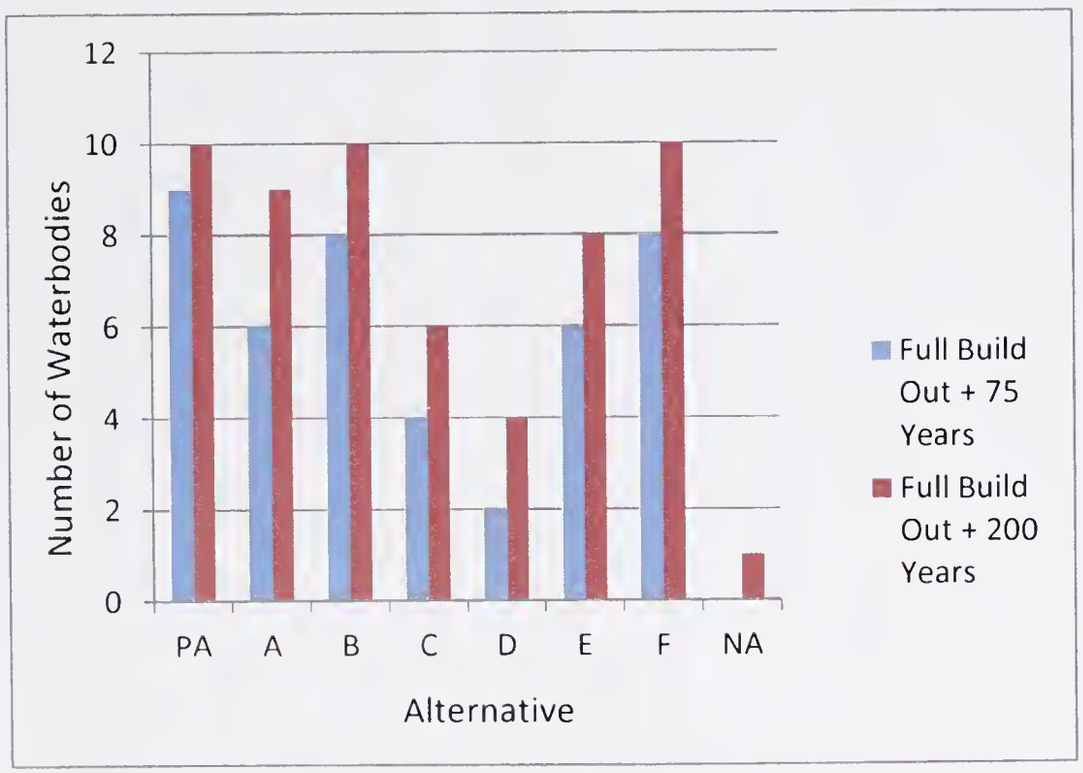
[1] Numbers are presented in sequence for the three model time frames: full build out, full build out plus 75 years, and full build out plus 200 years.



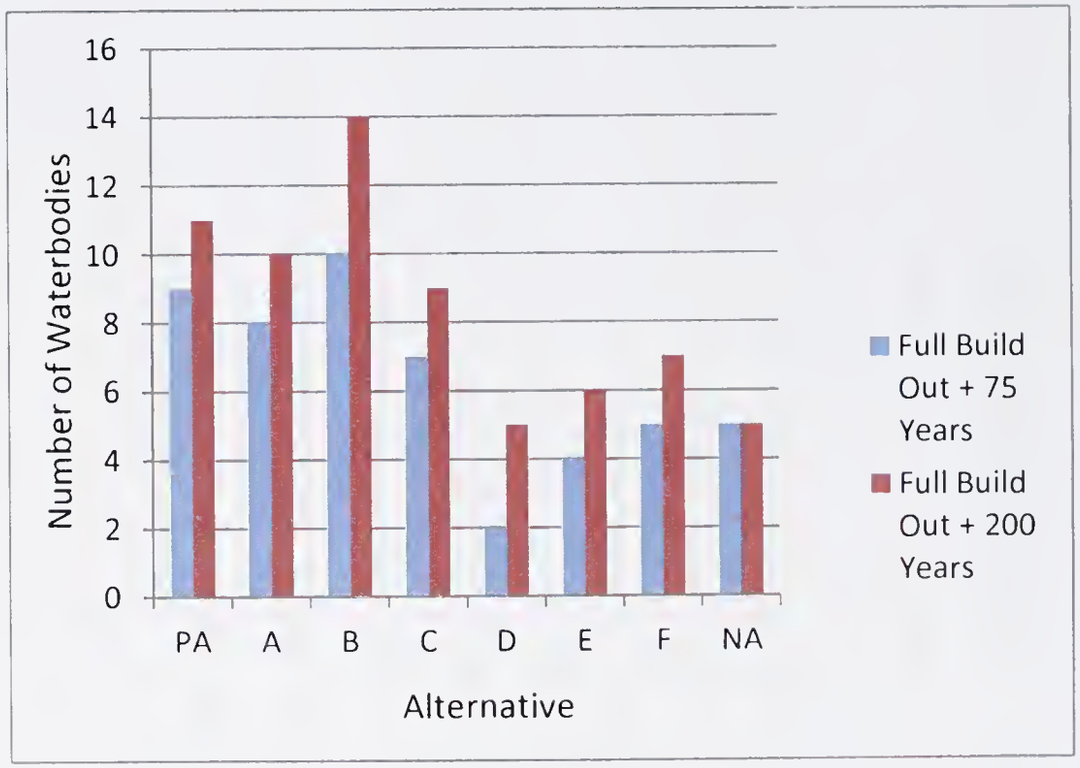
Streams with Aquatic Biology Resources with Potential Flow Reductions



Miles of Game Fish Streams with Potential Flow Reductions



Springs/Ponds/Lakes Containing Special Status Amphibian Species with Potential Flow Reductions



Springs/Ponds/Lakes Containing Game and Special Status Fish Species with Potential Flow Reductions

Figure 3.7-23 Comparison of Aquatic Biological Resource Pumping Impact Parameters

3.7.3 Cumulative Impacts

3.7.3.1 Impacts Common to All Alternatives

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the America Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and changes in precipitation regimes (Seager et al. 2007). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Aquatic Biological Resources

Since 1950, there has been an increase from 6 to 16 percent in annual precipitation for most of the Great Basin. This has been accompanied by a decrease in snowpack at most monitoring sites and an earlier spring snowmelt contribution to stream flow (Chambers 2008). The extent of climate-related precipitation change on aquatic habitats would depend on the water source (runoff or groundwater), magnitude, and timing of the precipitation regime (Grimm et al. 1997). As the seasonal variability increases and the amount and form of precipitation changes, aquatic species and their habitat likely would be impacted. Impacts to species could include changes in abundance, distribution, phenology, community composition, and the introduction of noxious species in the ephemeral pools, playas, springs, streams, lakes, and reservoirs in the region of study.

Climate change is predicted to increase water temperature in most regions including the arid Southwest (Meyer et al. 1999). The effect of increased water temperature on aquatic habitat and species could include changes in water quality conditions (e.g., dissolved oxygen) and biological conditions such as direct mortality from acute temperature stress, sublethal stress on physiological functions, and shifts in species distributions. In North America, the Intergovernmental Panel on Climate Change predicted that coldwater fisheries would likely be adversely affected, warmwater fish species generally would be positively affected, and cool water fisheries would have a mixture of positive and negative changes in terms of habitat conditions and species distribution and diversity. In general, climatic warming would result in a general shift in species distributions northward, with extinctions of cool-water species at lower altitudes and range expansion of warmwater and cool-water species into higher altitudes (Meyer et al. 1999).

Climate change effects on amphibian species are related to habitat factors and ecological requirements. As mentioned for other aquatic species, temperature and precipitation changes can affect population abundance and distribution patterns. Other climate-related changes can include effects on survival, growth, reproduction, food availability, predator-prey relationships, and increased risk to disease (Blaustein et al. 2010). Changes in ambient temperature also may influence the timing of breeding and periods of hibernation (Field et al. 2007; Blaustein et al. 2010).

As a means of assessing the vulnerability of species to climate change, NatureServe initiated a collaborative effort to develop a Climate Change Vulnerability Index (Young et al. 2009). The Index was applied to a selection of test species in Nevada, where it will be used to modify the State Wildlife Action Plan by incorporating climate change species information. Based on this initial case study (Young et al. 2009) and subsequent analyses by the NNHP (2011), vulnerability index ratings for aquatic species provide some indication of potential effects of climate change in the region of study. Index scores were highly vulnerable for White River desert sucker, Lahontan cutthroat trout, and Columbia spotted frog and moderately vulnerable for Pahrump poolfish, White River speckled dace, California floater, and northern leopard frog. These species are representative of a variety of habitats in the region of study including streams (Lahontan cutthroat trout, White River speckled dace, and White River desert sucker), springs and wetlands (northern leopard frog and Columbia spotted frog), ponds (Pahrump poolfish), and rivers and lakes (California floater). The factors that were identified as vulnerable for these species included macro-scale temperature requirements, micro-

and macro-scale precipitation requirements, migration movements, and physiological and historical hydrological niches.

Climate change could affect aquatic biological resources in the GWD Project Area by:

- Modification or alternation of aquatic habitats due to changes in precipitation;
- Potential changes in water temperature and other water quality parameters such as dissolved oxygen; and
- Potential changes in aquatic species abundance, distribution, phenology, and community composition in response to habitat and water quality changes.

3.7.3.2 Issues

Rights-of-way and Groundwater Development Area Construction and Maintenance

- Short-term, long-term, and permanent changes in aquatic habitat and species composition due to surface disturbance as a result of construction-related activities, and operational maintenance.
- Potential effects on fish spawning from habitat alteration.
- Loss of individuals, or populations of federal listed, candidate, or special status aquatic species due to surface disturbance.
- Compliance with management objectives defined in recovery plans, conservation agreements, and state wildlife action plans for special status aquatic species.
- Availability of fish species traditionally used for food by regional Tribes.
- Potential direct mortalities to amphibians from vehicle traffic.

Groundwater Pumping

- Short-term, long-term, and permanent changes in aquatic habitat and species, special status aquatic species and their habitats due to groundwater drawdown.
- Compliance with management objectives defined in recovery plans, conservation agreements, and state wildlife action plans for special status aquatic species.
- Changes in the availability of fish species traditionally used for food by regional Tribes in relation to groundwater drawdown.

3.7.3.3 Assumptions

Rights-of-way and Groundwater Development Area Construction and Maintenance

- Study Area. The study area is the proposed ROW project surface disturbance area (pipelines, power facilities, and roads) for each project alternative plus the total project surface disturbance estimate (well pads, roads, gathering pipelines, power lines) within groundwater development areas for each hydrographic basin. For ROWs, the focus was on perennial streams and springs with game fish or special status aquatic species that are crossed by ROWs, access roads, or other project facilities. For groundwater development areas, the presence of past, present, and reasonably foreseeable actions within the overall groundwater development area boundaries within each hydrographic basin was used as the basis for evaluating potential additive cumulative effects.
- Time frames. The effects analysis included time frames that ranged from several days to 2 years for a short-term effect and greater than 5 years for a long-term effect.
- The past and present action footprints are based on utility ROWs and other surface disturbance activities identified in the BLM and other data bases (Chapter 2).
- The reasonably foreseeable projects and activities are those outlined in **Table 2.9-1**, Chapter 2. No cumulative effects related to surface development activities are anticipated outside hydrographic basins occupied by project water development and conveyance facilities.

Groundwater Pumping

- Study area. The study area is the boundary for the groundwater model simulations.
- Time frames. The effects analysis included time frames from full build out of the entire project (approximately 2050) to full build out plus 200 years.

3.7.3.4 Methodology for Analysis

Rights-of-way and Groundwater Development Area Construction and Maintenance

- The cumulative surface disturbance effects to aquatic biological resources by hydrographic basin were estimated by overlaying the existing surface disturbances for (PPAs), RFFAs, and the development areas for the project alternative being evaluated. The estimated cumulative surface disturbance was then compared with the overall area of the hydrographic basin affected.
- The cumulative surface disturbance effects to special status aquatic species were estimated from evaluating the cumulative aquatic biological resource surface disturbance footprint in relation to the habitat requirements of special status plants to provide a risk assessment for future effects on these species.
- The potential cumulative changes in the availability of plants traditionally used for food and fiber by regional tribe were estimated from evaluating the cumulative vegetation community surface disturbance footprint in relation to the habitat requirements of food and fiber plants.

Groundwater Pumping

- The cumulative analysis focuses on those basins and waterbodies with aquatic biological resources that were predicted to be affected by each alternative. This represents the incremental effect of the alternative on aquatic biological resources in combination with other cumulative pumping actions.
- Figures were used to show the effects of pumping on springs and perennial streams with game fish and special status species using a spring and stream impact parameter. For each alternative, impact parameter information was shown in chart format for cumulative pumping with No Action, project alternative, and cumulative with the project alternative.
- The groundwater flow model was used to predict the groundwater drawdown from pumping. The overlap of the 10-foot drawdown contour with perennial streams and springs with game fish and special status aquatic species was used as the first step and key assumption in identifying areas of potential risk.
- Springs and Streams with Risk to Pumping. The 10-foot drawdown index was applied to the springs and perennial stream reaches that were classified as being at risk from groundwater drawdown (Section 3.3, Water Resources). The springs included for analysis were those rated as presenting a "high" or "moderate" risk of effects. The number of springs and miles of perennial stream reaches potentially affected were enumerated for each alternative over time from the modeling results.

3.7.3.5 No Action

Groundwater Development Area

Under the No Action Alternative, the proposed project would not be constructed or maintained. No project-related surface disturbance would occur. Vegetation communities would continue to be influenced by natural events such as drought and fire and land use activities such as grazing, and existing water diversions. Management activities on public lands will continue to be directed by the Ely and Las Vegas RMPs, which involve measures to maintain natural vegetation communities. Management guidance for other public lands in the project study area would be provided by Great Basin Park General Management Plan and the Forest Plan for the Humboldt-Toiyabe National Forest. Future actions would consist of six projects: Wilson Creek Wind (southern Spring and Lake valleys), Spring Valley Wind (Spring Valley), ON Transmission Line (Cave, Dry Lake, Delamar, Pahranagat, Coyote Spring, Hidden, and Garnett valleys), TransWest Express, Zephyr Transmission Lines (Delamar, Pahranagat, Coyote Spring, Hidden, and Garnett valleys), and Kane Springs Valley Ground Water Development (Kane Springs and Coyote Springs valleys). Surface disturbance activities associated with construction and maintenance activities could adversely affect aquatic habitat and species in Spring Valley. GWD Project areas in the other basins have limited perennial stream and spring habitats.

Groundwater Pumping Effects

The No Action Alternative includes past and present groundwater pumping, while No Action with cumulative adds RFFA pumping. Cumulative pumping with No Action could reduce flows and adversely affect aquatic biological resources in springs and streams within 8 to 13 hydrologic basins for the 3 model periods. Groundwater basins affected at the full build out plus 200 years would include Steptoe, Spring [#184], Snake, White River, Pahranagat, Lake, Dry Lake, Dry, Panaca, Clover, Muddy Springs Area, Lower Meadow Valley Wash, and Lower Moapa (**Appendix F**, **Tables F3.7-38** and **F3.7-39**). The effects of reduced flows would modify aquatic habitat in terms of decreased depth, water velocity, wetted area, and water quality parameters such as sedimentation and temperature. The effects of these habitat changes on aquatic biota could include reductions in abundance and taxonomic diversity, composition changes, loss of food sources, altered spawning and rearing success, restricted movement, and potential adverse effects on health.

Cumulative pumping with No Action could reduce flows and adversely affect aquatic biota in 9 and 14 springs/ponds/lakes at the full build out plus 75 and full build out plus 200 years time frames, respectively. Five springs/ponds/lakes would be affected at full build out. Pumping could affect the following number of springs or lakes with game fish or special status species for the three model periods: game fish and special status fish (2 to 8), special status amphibians (1 to 3), and special status invertebrates (1 to 6). Five or six small springs could dry up for the full build out plus 75 years and full build out plus 200 years time frames, respectively, which could result in a total loss of habitat and associated species. Three small springs could be affected at full build out. Loss of fish species such as dace and suckers and macroinvertebrates associated with spring inflow and outflow in riffle habitat could occur as a result of reduced flows. Reductions in population numbers and health of pool species such as springfishes, spinedaces, and macroinvertebrates could result from decreased water levels in pools.

Cumulative pumping with No Action also could reduce flows in the following number of streams for the 3 model time frames: full build out (4), full build out plus 75 years (6), and full build out plus 200 years (11). The estimated stream miles with game fish or special status species were 22, 26, and 51 for the 3 model time frames. The game fish streams have traditional values to regional Tribes. Loss of riffle and run habitats could result in the loss of trout, dace, and sucker species and macroinvertebrates that utilize these habitats. If stream segments should dry up, there would be a total loss of species.

Cumulative pumping with No Action could affect habitat for three federally listed fish species: White River spinedace, Big Springs spinedace, and Moapa dace. Spring flow or water level reductions were determined at the following locations for these species:

- **White River Spinedace:** The model-simulated flow reduction indicated a reduction of 7 percent at the full build out plus 200 years time frame in Preston Big Spring.
- **Big Springs Spinedace** – The 10-foot drawdown contour overlapped with 0.1 mile of occupied and critical habitat for this species in Meadow Valley Wash in Dry Valley during the full build out plus 200 years time frame. In total 3.1 miles of habitat exists in Meadow Valley Wash in this valley. Pumping would not affect flows in 2.1 miles of Big Springs spinedace habitat in Meadow Valley Wash in Panaca Valley.
- **Moapa Dace** – Model-predicted flow reductions were shown for all three model time frames in the Muddy River near Moapa, with percentages ranging from -37 to -61. This represents a substantial reduction in habitat for this species.
- **Pahrump Poolfish:** Since the 10-foot drawdown contour did not overlap Shoshone Ponds, No Action pumping would not affect Pahrump poolfish.
- **Other Federally Listed Species** – Cumulative pumping with No Action would not affect habitat for the following species: Hiko White River springfish (Hiko and Crystal springs), White River springfish (Ash Spring), and Pahranagat roundtail chub (Pahranagat Creek). Model-predicted flow reductions were less than 4 percent in Ash, Crystal, and Hiko springs for the three model periods.

Cumulative pumping with No Action would not affect flows or water levels in springs and streams in GBNP or Utah.

3.7.3.6 Proposed Action

Groundwater Development Area

Rights-of-way and Groundwater Development Area Construction and Maintenance

Habitat Alteration and Direct/Indirect Effects on Aquatic Species

PPAs consist primarily of existing roads, energy utility corridors, mining districts, and recent wildfires (**Figures 2.9-1** and **2.9-2**). Other activities that have influenced aquatic habitat and species include livestock grazing over nearly all public lands. The primary future actions consist of construction of the Wilson Creek Wind Project in southern Spring Valley and northern Lake Valley; the Spring Valley Wind Project in Spring Valley; the ON Transmission Line Project (overlaps with the GWD Project in Cave, Dry Lake, Delamar, Pahranagat, Coyote Springs, Hidden, and Garnett valleys); the TransWest Express and Zephyr Transmission Projects overlap with the GWD Project in Delamar, Pahranagat, Coyote Spring, Hidden, and Garnett valleys; Coyote Springs Development, and the Kane Springs Valley Groundwater Development Project in Kane Springs and Coyote Spring valleys. Of these cumulative projects, one (Spring Valley Wind Project) potentially could affect aquatic habitat and species that are located within the Spring Valley groundwater development for the GWD Project. Aquatic species located in perennial streams and springs in the Spring Valley groundwater development area are listed in **Tables 3.7-1** and **3.7-2**. The BLM BMPs, ACMs, and mitigation measures involving avoidance of springs and perennial streams would mean that the GWD Project would not contribute incremental effects to aquatic biological resources in the Spring Valley groundwater development area. No future projects overlap with the three streams (Snake, Steptoe, and Big Wash) that are located with the GWD Project ROWs or one stream (Geyser Creek) crossed by the Option 2 alignment in Lake Valley.

Cumulative Effects. The areas where the GWD Project surface disturbance would potentially overlap with PPAs, and reasonably foreseeable future actions (**Figures 2.9-1** and **2.9-2**) include existing road and highway crossings in all hydrographic basins; the LCCRDA utility corridor that extends from southern Dry Lake Valley to the vicinity of Apex (currently occupied by one electrical transmission line, but likely will contain one or more additional high voltage electrical transmission lines in the next 10 years), and intersection with the Spring Valley Wind Project in Spring Valley. The major additive cumulative effects would be the expansion in the width of adjacent utility ROWs, which could cross streams or be located adjacent to streams and springs in Spring Valley. Some new roads also could cross streams. It is not expected that cumulative development would substantially expand the surface disturbance to aquatic biological resources, based on only four perennial streams (Snake, Steptoe, Big Wash, and Geyser [Option 2 alignment]) that would be affected by the GWD Project. By implementing BMPs, ACMs, and mitigation recommendations involving avoidance of streams and springs in the groundwater development areas in Spring and Snake valleys, the GWD Project would not contribute incremental effects to aquatic biological resources in combination with other cumulative actions.

Compliance with Management Objectives for Special Status Aquatic Species

Cumulative Effects. Two special status aquatic species (Bonneville cutthroat trout and northern leopard frog) were evaluated as part of ROW and groundwater development surface disturbance activities for the GWD Project. Within the ROW and groundwater development areas analyzed as part of the GWD Project, Bonneville cutthroat trout occurs in headwater areas in 2 streams in Spring Valley (Pine and Ridge creeks) and 23 streams in Snake Valley (**Appendix F, Table F3.7-2**). Northern leopard frog occurs in numerous springs in Spring and Snake valleys (**Appendix F, Table F3.7-7**). The GWD Project would likely intersect service roads for wind energy projects in Spring Valley. Management objectives for these species are listed in **Appendix F, Table F3.7-8**. The following conclusions are made regarding cumulative effects to these two species:

- Bonneville Cutthroat Trout – Construction and maintenance activities would not affect two streams (Snake Creek and Big Wash) crossed by ROWs because this species occurs in headwater areas located upstream of the proposed crossings. For the groundwater development areas, implementation of mitigation recommendations involving avoidance of streams and springs in the groundwater development areas in Spring and Snake valleys would avoid impacts to Bonneville cutthroat trout. The GWD Project would not contribute incremental effects to this species in combination with other cumulative actions. Therefore, cumulative effects involving conflicts with management objectives for Bonneville cutthroat trout are not expected.
- Northern Leopard Frog – Construction and maintenance activities within the ROWs and groundwater development areas for the GWD Project could cause mortalities to northern leopard frog from vehicle traffic. These unquantifiable effects would contribute to potential mortalities from vehicle traffic for other cumulative actions.

No direct adverse effects are predicted for breeding habitat, since groundwater development ROWs do not cross springs and recommended mitigation for the groundwater development areas would avoid springs with special status aquatic species. When considering springs with known habitat for this species, cumulative effects could occur in Spring Valley. In conclusion, potential conflicts with management objectives (i.e., reduce road-related mortality) for northern leopard frog could result from cumulative actions.

Tribal Traditional Use of Fish

Cumulative Effects. Traditional use of native and non-native fish species occur in perennial streams in three hydrographic basins (Spring, Snake, and Steptoe) that have been affected by PPAs, and would be affected by reasonably foreseeable actions, and the proposed GWD Project facilities. It is not expected that cumulative development would substantially expand the surface disturbance to aquatic biological resources, based on only three perennial streams (Snake, Steptoe, and Big Wash) that would be affected by the GWD Project ROWs. By implementing BMPs, ACMs, and mitigation recommendations involving avoidance of streams in the groundwater development areas in Spring and Snake valleys, the GWD Project would not contribute incremental effects to Traditional use fish species in combination with other cumulative actions.

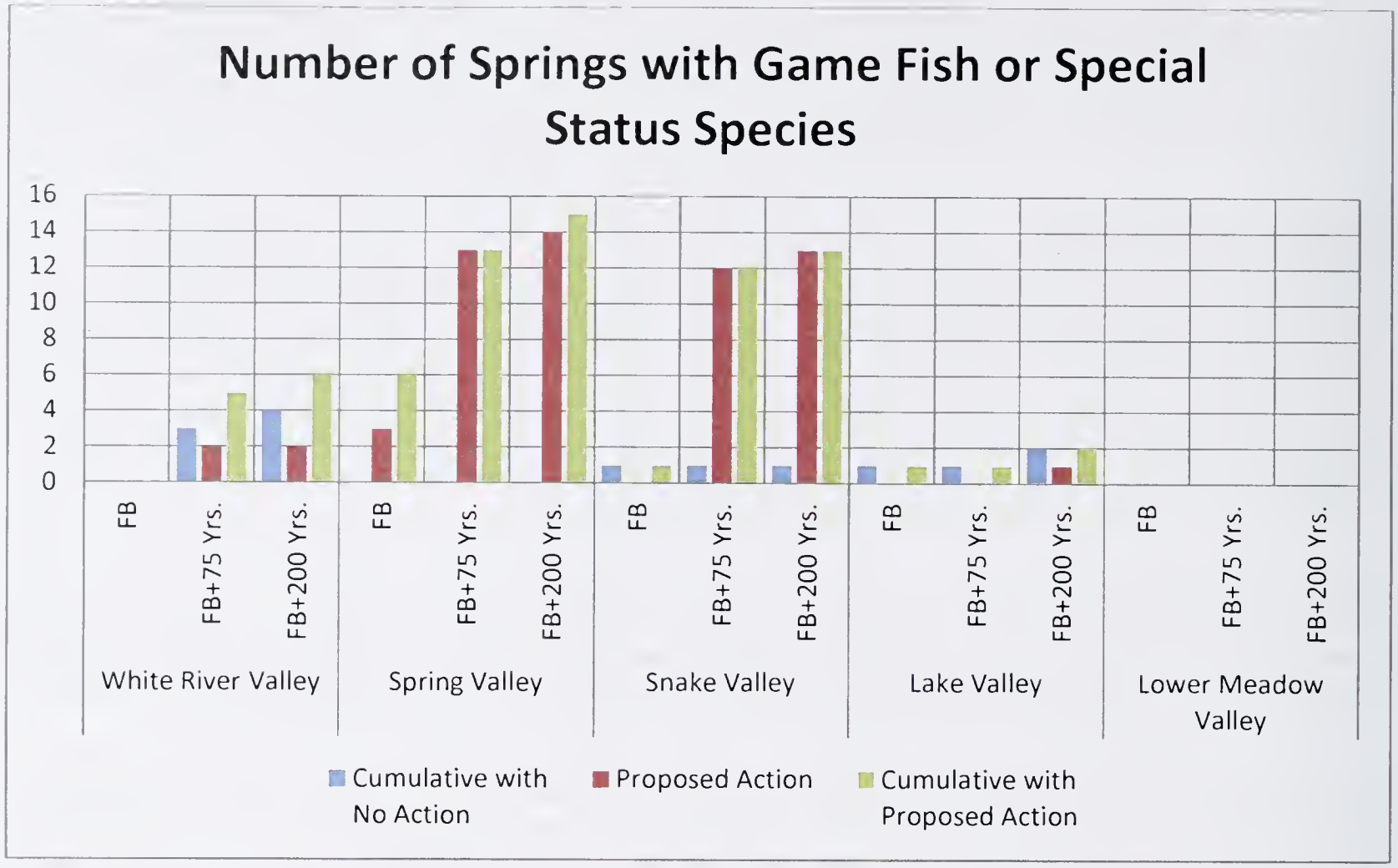
Groundwater Pumping Effects

PPAs are represented by the No Action pumping operations described in Section 3.3, Water Resources. The reasonably foreseeable actions are described in **Table 2.9-1**. The following discussions are based on an interpretation of the groundwater model simulations that predict groundwater drawdown elevations and changes in flow in springs and perennial streams that contain game fish and special status fish, invertebrate, and amphibian species.

Detailed results of the cumulative pumping analysis with the Proposed Action are provided in **Appendix F**, **Tables F3.7-26** and **F3.7-27** for springs/ponds/lakes and streams, respectively. As discussed in water resources (Section 3.3, Water Resources), the cumulative analysis focused on the incremental pumping effects that could be contributed by the Proposed Action in combination with other cumulative pumping activities. In total, 6 to 13 basins with aquatic biological resources could be affected by this cumulative analysis for the three model time frames. However, only six of these basins could be affected by the Proposed Action: White River, Spring (#184), Snake, Lake, Pahranagat, and Lower Meadow Valley Wash.

Percent flow reduction and impact indicator information are summarized in **Appendix F**, **Table F3.7-40** and shown in **Figure 3.7-24**. The summary and figure include impact parameter information for cumulative with No Action, Proposed Action, and cumulative pumping with the Proposed Action as a way of identifying the incremental effects of the alternative. The following conclusions were made based on this summary:

- Spring Valley (#184) – The Proposed Action could contribute to flow reductions (30 to 100 percent) in springs and streams in Spring Valley. These adverse effects on aquatic habitat could occur in all three model periods. For those springs with model-predicted flow changes, total or substantial loss of habitat could occur in Keegan, North Millick, and South Millick springs. The spring and stream impact parameters indicate that the Proposed Action could contribute most of the incremental cumulative effects on spring and stream habitat and species in this basin. In total, the Proposed Action could affect 3 to 14 springs and 4 to 20 streams with game fish or special status aquatic species for the 3 model time frames. No Action cumulative pumping could contribute reduced flows to three of the streams with biological resources in this valley (or 15 percent of the streams affected by Proposed Action pumping). No Spring Valley springs with biological resources could be affected by No Action cumulative pumping.
- Snake Valley – The Proposed Action could contribute reduced flows in Snake Valley springs and streams. Spring and stream habitat could be affected at the full build out plus 75 years and full build out plus 200 years time frame. Total loss of habitat could occur in Big Springs, based on model-predicted flow changes. The impact parameter information indicates that the Proposed Action contributes almost all of the cumulative effects on aquatic habitat and species in this basin. In total, the Proposed Action could reduce flows in 0 to 13 springs and 0 to 8 streams with game fish or special status aquatic species for the three model time frames.



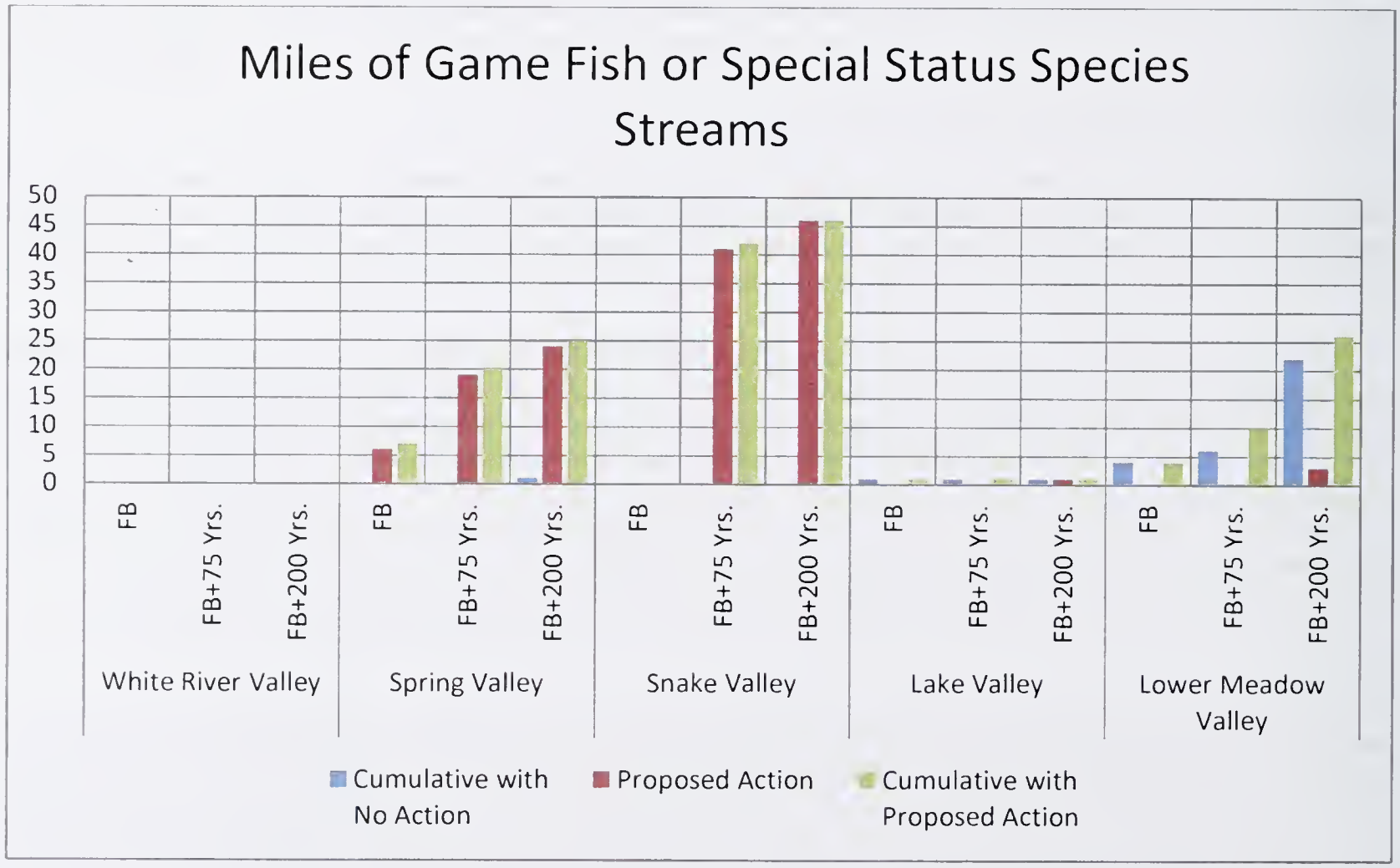


Figure 3.7-24 **Cumulative Analysis with the Proposed Action and No Action Using Aquatic Biological Resource Impact Parameters**

- White River Valley – The Proposed Action could contribute reduced flows (1 to 18 percent) in 2 springs (Butterfield and Flag) in White River. This alternative also could contribute very small flow reductions (1 to 3 percent) in 5 other springs (Arnoldson, Hot Creek, Moorman, Nicolas, and Preston Big). Most of the estimated flow reduction for Arnoldson, Nicolas, and Preston Big could result from No Action pumping. The spring and stream impact parameters indicate that the Proposed Action and No Action contribute cumulative effects on spring habitat and species in this basin. The impact parameter information shows that Proposed Action pumping could affect 0 to 2 springs. No Action also could reduce flows in 0 to 4 springs in this basin. Cumulative effects on spring habitat and species could result from No Action and Proposed Action pumping.

- Lake Valley – Proposed Action pumping could contribute to reduced flows in one spring and one stream at full build out plus 200 years time frame. No Action also could reduce flows in 1 to 2 springs (all 3 model time frames) and 0 streams (full build out plus 200 years). The spring and stream impact parameters indicate that the Proposed Action and No Action contribute cumulative effects on spring habitat and species in this basin.

- Pahranagat Valley – Proposed Action pumping could reduce flows in 1 stream (Pahranagat Creek) with game fish or special status aquatic species at full build out plus 200 years time frame. No Action pumping also could contribute to reduced flows in this same stream during all three model time frames.

- Lower Meadow Valley Wash – The Proposed Action could contribute very small flow reductions to Lower Meadow Valley Wash and Muddy River Springs Area. Most of the cumulative effects on stream habitat could result from cumulative pumping with No Action.

Cumulative pumping with the Proposed Action could affect habitat for four federally listed fish species, White River spinedace, Pahrump poolfish, Big Springs spinedace, and Moapa dace. The Proposed Action only could contribute effects to two of these species, White River spinedace and Pahrump poolfish. Spring flow or water level reductions were determined at the following locations for these species:

- White River Spinedace – Although the 10-foot groundwater drawdown contours did not overlap with springs occupied by this species, the model simulation predicted cumulative flow reductions of 2, 9, and 19 percent for the 3 model time frames in the Flag Spring complex. The Proposed Action could contribute most of the flow reduction in Flag Spring (-1 to -17). The predicted cumulative flow reduction in Preston Big Springs ranged from 2 to 8 for the 3 model time frames. Proposed Action pumping could contribute a very small portion of the predicted flow reduction (0 to -1) in Preston Big Springs. These springs are considered critical habitat for White River spinedace.

- Pahrump Poolfish – Potential water level reductions were predicted for all three model time frames in Shoshone Ponds. No information is available to quantify the potential flow reduction in the ponds. The Proposed Action pumping could contribute all of the reduced flow risk predicted for Shoshone Ponds.

- Big Springs Spinedace – No Action and other cumulative pumping could result in potential flow reductions in Meadow Valley Wash in Dry and Panaca valleys. In total, approximately 0.5 mile of the 5.2 miles of occupied and critical habitat could be adversely affected at the full build out plus 200 years time frame. The Proposed Action would not contribute to these effects on habitat for this species. Habitat in Condor Canyon in Upper Meadow Valley Wash in Panaca Valley could be affected in approximately 0.4 mile at the full build out plus 200 years time frame. No effect was indicated in the analysis for the full build out and full build out plus 75 years time frame.

- Moapa Dace – Cumulative pumping with No Action could result in flow reductions in the Muddy River. Proposed Action could not contribute to these effects on habitat for this species. Model-predicted cumulative flow reductions were shown for all three model time frames, with percentages ranging from -37 to -62. Proposed Action pumping could contribute a very small portion of this flow reduction (0 to -1 percent).

- Other Federally Listed Species – Cumulative pumping with the Proposed Action would not affect habitat for the following species: Hiko White River springfish (Hiko and Crystal springs), White River springfish (Ash Spring), and Pahranagat roundtail chub (Pahranagat Creek). Model-simulated flow reductions were estimated to be 0 to 5 percent in Ash and Crystal springs for the three model periods.

Cumulative pumping with the Proposed Action could contribute risks for habitat reductions for other special status fish, amphibians (northern leopard frog), and invertebrates (springsnails and California floater) in these six basins. Total loss of habitat could occur in Keegan, North Millick, and South Millick springs in Spring Valley and Big Springs in Snake Valley. Specific waterbodies and their associated species at risk are provided in **Appendix F**, **Tables F3.7-26** and

F3.7-27. In total, 7 to 29 springs/lakes with game fish or special status species could be affected by cumulative pumping in these 6 basins at the 3 model time frames. Cumulative effects on stream habitat for game fish or special status aquatic species would range from 29 to 127 miles for the 3 model time frames.

The Proposed Action could contribute to cumulative effects on two springs (Outhouse and Rowland) and two streams (Lehman and Snake) in Snake Valley with aquatic biological resources in GBNP. Data are not available to quantify the cumulative effect on habitat in these springs. Stream miles affected by this alternative included 1.8 miles for Snake Creek at the full build out plus 75 years and full build out plus 200 years time frame and 0.5 mile for Lehman Creek at the full build out plus 200 years time frame. Snake and Lehman creeks and Rowland Spring contain game fish species. Outhouse springs contain springsnails. Additional streams at risk include Shingle and Williams Canyon creeks in Spring Valley and Baker and Strawberry creeks in Snake Valley.

In Utah, cumulative pumping with the Proposed Action could reduce flows in two springs (Clay and Stateline) and two streams (Lake and Snake) in Snake Valley with aquatic biological resources. Data are not available to quantify the cumulative effect on habitat in these springs. Stream miles affected at the full build out plus 75 years and full build out plus 200 years time frame included 1.2 miles for Snake Creek and 10.6 miles for Lake Creek. Flow reductions in Lake Creek would result in reduced flow input to Pruess Lake in Utah. Snake Creek supports game fish species, while Lake Creek contains native fish species. Springsnails are present in Stateline and Clay Springs.

Cumulative pumping with the Proposed Action could conflict with conservation agreements for Bonneville cutthroat and northern leopard frog in Spring and Snake valleys and recovery plans for Pahrump poolfish and White River spinedace in Spring and White River valleys, respectively. Potential conflicts with the recovery plan for Big Springs spinedace would be caused by No Action and other cumulative action pumping.

The availability of fish species traditionally used for food by regional Tribes in relation to groundwater drawdown also could be affected in all six basins identified above with cumulative effects on native and non-native fish species. The majority of the streams at risk from pumping are located in Snake and Spring valleys. These streams were traditionally used by the Confederated Tribes of the Goshute Reservation.

3.7.3.7 Alternative A

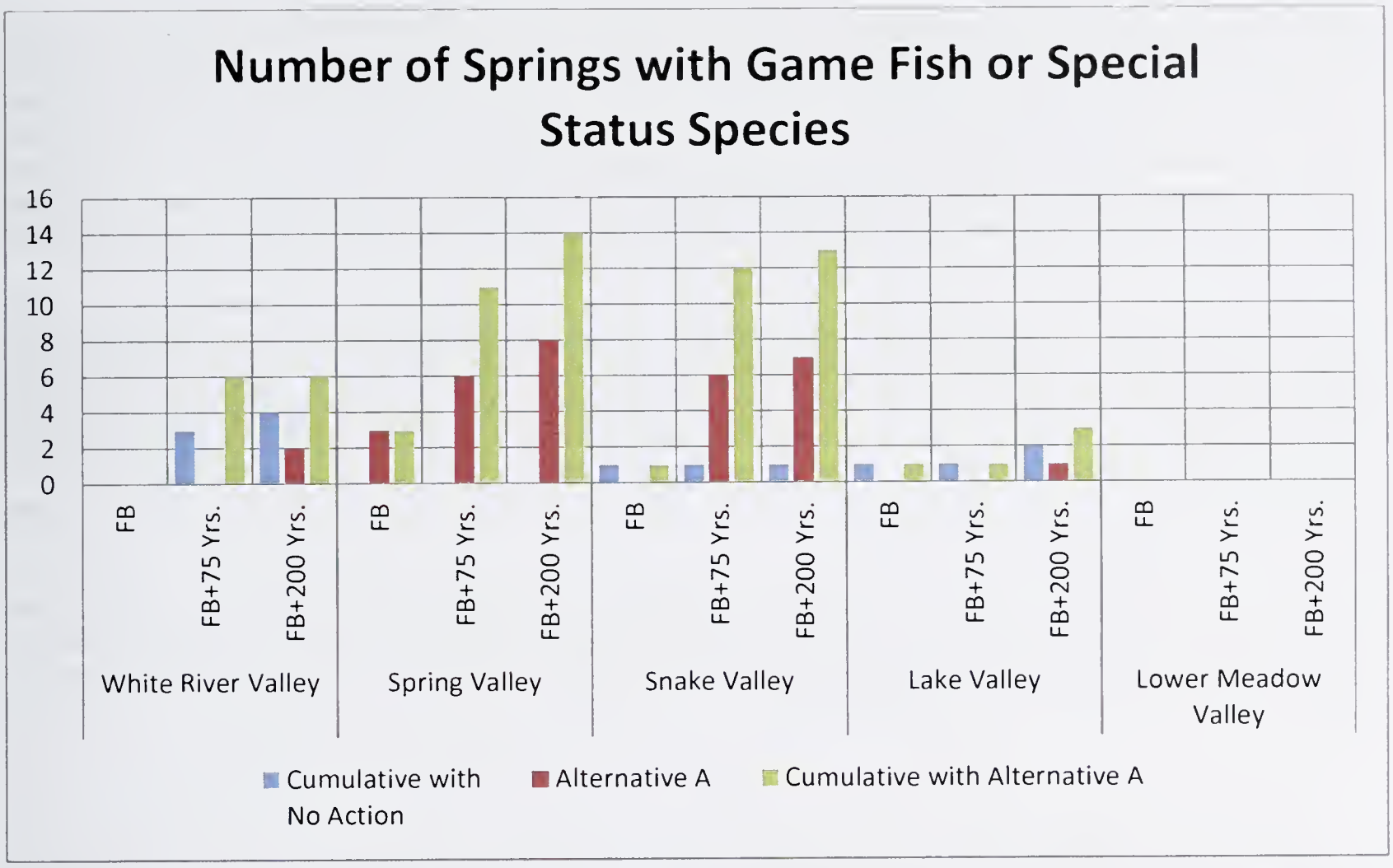
Right-of-ways and Groundwater Development Area Construction and Maintenance

The effects of Alternative A surface disturbance resulting from ROWs and project facilities in combination with other cumulative actions on aquatic biological resources would result in the same types of impacts discussed for cumulative impacts with the Proposed Action.

Groundwater Pumping Effects

Detailed results of the cumulative pumping analysis with Alternative A are provided in **Appendix F**, **Tables F3.7-28** and **F3.7-29** for springs/ponds/lakes and streams, respectively. The cumulative analysis focused on the incremental pumping effects that could be contributed by Alternative A in combination with other cumulative pumping activities. In total, 6 to 13 basins with aquatic biological resources could be affected by this cumulative analysis for the 3 model time frames. However, only four of these basins could be affected by the Proposed Action: White River, Spring (#184), Snake, and Lake valleys.

Percent flow reduction and impact indicator information are summarized in **Appendix F**, **Table F3.7-41** and shown in **Figure 3.7-25**. The summary and figure include impact parameter information for cumulative with No Action, Alternative A, and cumulative pumping with Alternative A as a way of identifying the incremental effects of the alternative. One notable difference for this cumulative pumping scenario would be that the magnitude of flow reduction would be smaller compared to cumulative pumping with the Proposed Action. Therefore, the magnitude of effects on reduced habitat would be lower in White River and Spring valleys. Based on the model-simulated flow predictions for Big Spring, the flow reduction would be the same for cumulative pumping with the Proposed Action and Alternative A.



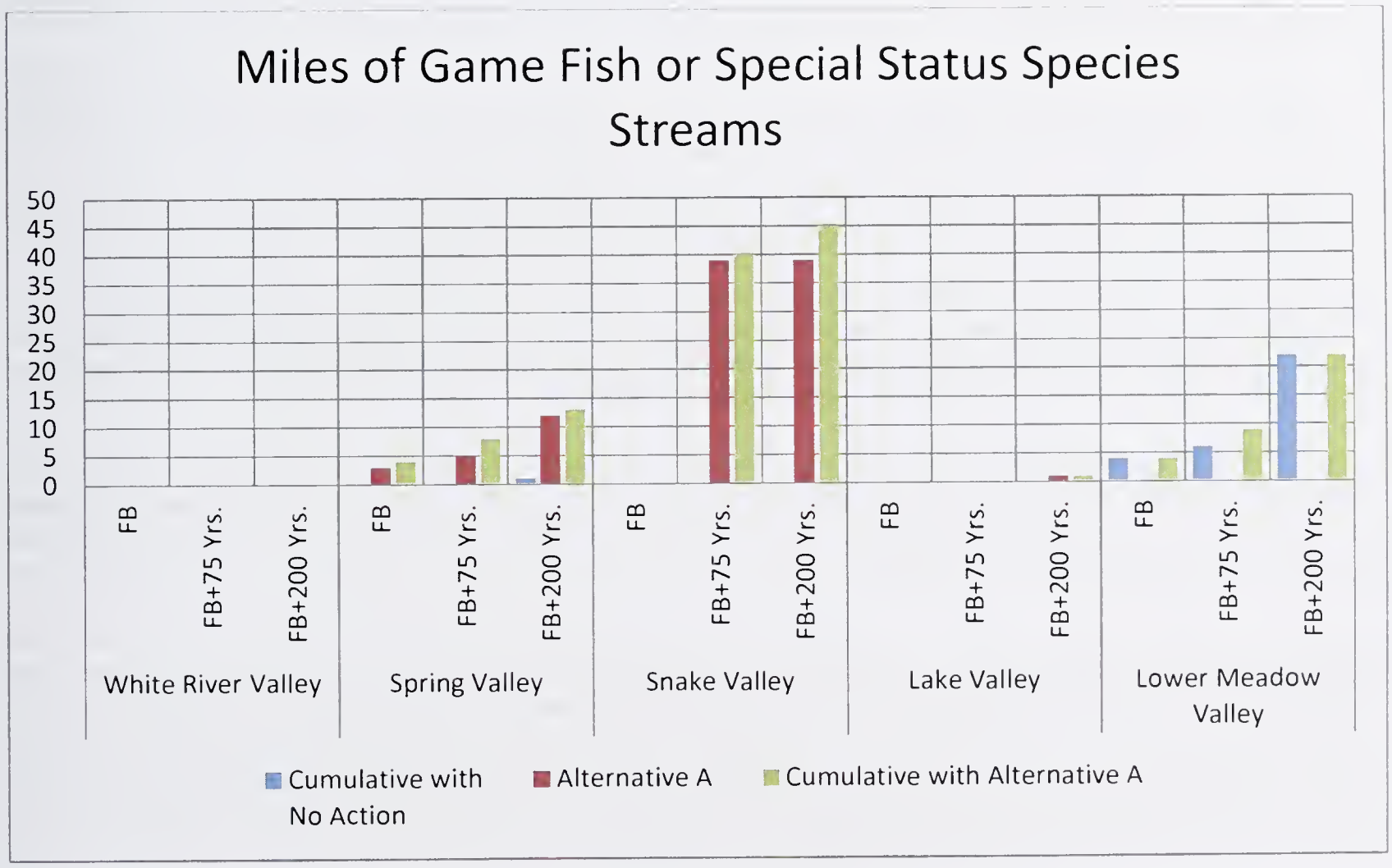


Figure 3.7-25 Cumulative Analysis with Alternative A and No Action Using Aquatic Biological Resource Impact Parameters

Based on the overlap of the 10-foot drawdown to springs and streams with aquatic biological resources, the number of affected springs and streams would be generally similar for cumulative pumping with the Proposed Action and Alternative A. The only notable exception could be Spring Valley, where the list of affected springs and streams would be less than cumulative pumping with the Proposed Action. For example, stream miles (i.e., streams containing game fish or special status aquatic species) affected by pumping could range from 2 to 12 for Alternative A model time frames, with the range for cumulative pumping being 4 to 13 miles. In contrast, the stream mile range for Proposed Action would be 6 to 24 for the three model time frames and 7 to 25 miles for cumulative pumping. Pumping effects on spring habitat and species in this basin also would be less than cumulative pumping with the Proposed Action.

The relative contribution of Alternative A to cumulative effects on aquatic habitat is shown in **Figure 3.7-25**. The figure includes impact parameter information for cumulative with No Action, Alternative A, and cumulative pumping with Alternative A. The same general pattern of relative contribution to cumulative pumping effects is evident for Alternative A and the Proposed Action. Alternative A could contribute a substantial portion of reduced habitat in Spring and Snake valleys. There could be more equal contribution of incremental effects from No Action and Alternative A in White River and Lake valleys. No Action pumping contributes all of the effects on habitat in Lower Meadow Valley Wash and Pahranagat Valley.

Cumulative pumping with Alternative A could affect habitat for four federally listed fish species, White River spinedace, Pahrump poolfish, Big Springs spinedace, and Moapa dace. Alternative A only would contribute effects to two of these species, White River spinedace and Pahrump poolfish. Spring flow or water level reductions were determined at the following locations for these species:

- White River Spinedace – Although the 10-foot groundwater drawdown contours overlap with springs occupied by this species, the model simulation predicted cumulative flow reductions of 1, 5, and 11 percent for the 3 model time frames in the Flag Spring complex. Most of this flow reduction could result from Alternative A pumping (-1 to -8 percent). Alternative A pumping could result in a very small percent flow reduction in Preston Big Springs (0 to -1 percent).
- Pahrump Poolfish – Potential water level reductions were predicted for all three model time frames in Shoshone Ponds. No information is available to quantify the potential flow reduction in the ponds. Alternative A pumping would contribute all of the incremental effects on habitat for Pahrump poolfish.
- Big Springs Spinedace – No Action and other cumulative pumping actions could affect flows in Meadow Valley Wash in Panaca Valley. Alternative A pumping is not expected to affect flows in this stream.
- Moapa Dace – Cumulative pumping with No Action would likely result in flow reductions in the Muddy River. Alternative A would not contribute to these effects on habitat for this species. Model-predicted cumulative flow reductions were shown for all three model time frames, with percentages ranging from -37 to -61. Alternative A could contribute a very small portion of flow reduction in the Muddy River (0 to -1 percent).

Other Federally Listed Species – Cumulative pumping with Alternative A would not affect habitat for the following species: Hiko White River springfish (Hiko and Crystal springs), White River springfish (Ash Spring), and Pahranagat roundtail chub (Pahranagat Creek). Model-simulated flow reductions of 0 to 4 percent were predicted for Ash and Crystal springs for the three model periods.

Cumulative pumping with Alternative A would contribute risks for habitat reductions for other special status fish, amphibians (northern leopard frog), and invertebrates (springsnails and California floater) in these five basins. Total loss of habitat could occur in Big Springs in Snake Valley, based on model-predicted flow changes. Specific waterbodies and their associated species at risk are provided in **Appendix F**, **Tables F3.7-28** and **F3.7-29**. In total, 4 to 27 springs with game fish or special status species could be affected by cumulative pumping in these 5 basins at the 3 model time frames. Cumulative effects on stream habitat for game fish or special status aquatic species would range from 25 to 109 miles for the 3 model time frames.

Alternative A would contribute to cumulative effects to the same springs and streams and associated aquatic species in GBNP and Utah, as discussed for cumulative pumping with the Proposed Action. Flow data are not available to predict the percent flow reduction for these aquatic habitats.

Cumulative pumping with Alternative A could conflict with conservation agreements for Bonneville cutthroat and northern leopard frog in Spring and Snake valleys and recovery plans for Pahrump poolfish and White River spinedace in Spring and White River valleys, respectively.

The availability of fish species traditionally used for food by regional Tribes in relation to groundwater drawdown also could be affected in all five basins identified above regarding cumulative effects on game fish or special status fish species.

3.7.3.8 Alternative B

Right-of-ways and Groundwater Development Area Construction and Maintenance

The effects of Alternative B surface disturbance resulting from ROWs and project facilities in combination with other cumulative actions on aquatic biological resources would be the same as discussed for cumulative impacts with the Proposed Action.

Groundwater Pumping Effects

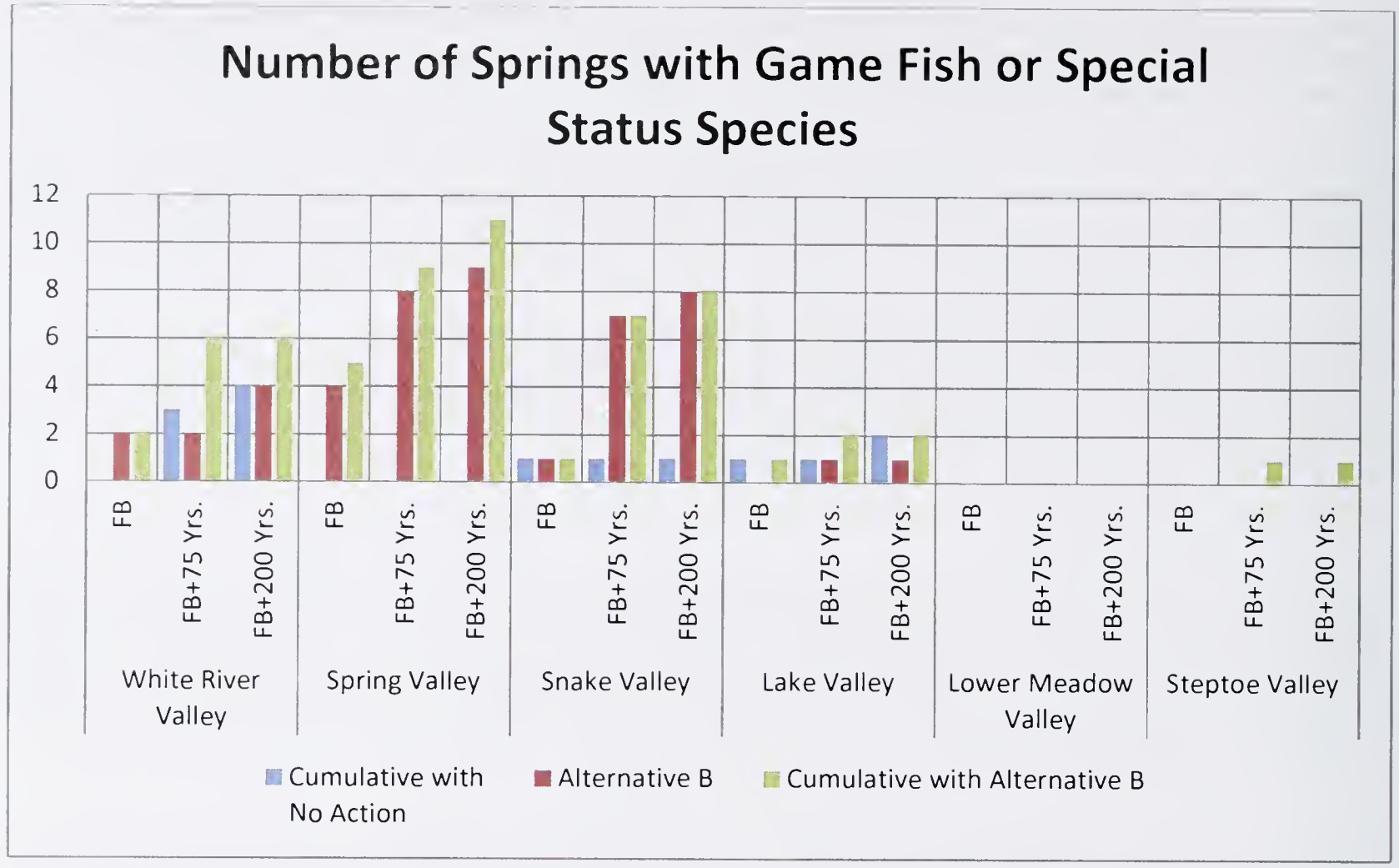
Detailed results of the cumulative pumping analysis with Alternative B are provided in **Appendix F**, **Tables F3.7-30** and **F3.7-31** for springs/ponds/lakes and streams, respectively. The cumulative analysis focused on the incremental pumping effects that would be contributed by the Alternative B in combination with other cumulative pumping activities. In total, 6 to 14 basins with aquatic biological resources would be affected by this cumulative analysis for the 3 model time frames. However, only seven of these basins would be affected by Alternative B: White River, Steptoe, Spring (#184), Snake, Lake, Pahranagat, and Lower Meadow Valley Wash. The addition of Steptoe Valley is unique to Alternative B, since this basin was not affected by the Proposed Action or Alternative A.

Percent flow reduction and impact indicator information are summarized in **Appendix F**, **Table F3.7-42**. Using model-simulated flow information, the magnitude of effects on reduced habitat would be higher in White River Valley and lower in Spring Valley in comparison to the Proposed Action. Based on the model-simulated flow predictions for Big Spring, the flow reduction would be similar for cumulative pumping with the Proposed Action and Alternative B.

The relative contribution of Alternative B to cumulative effects on aquatic habitat is shown in **Figure 3.7-26**. The figure includes impact parameter information for cumulative with No Action, Alternative B, and cumulative pumping with Alternative B. The same general pattern of relative contribution to cumulative pumping effects is evident for Alternative B and the Proposed Action. Alternative B would contribute a substantial portion of reduced habitat in Spring and Snake valleys. There would be more equal contribution of incremental effects from No Action and Alternative B in White River and Lake valleys. No Action and Alternative B pumping contribute most of the effects on habitat in Lower Meadow Valley Wash. No Action and Alternative B pumping contribute effects to aquatic habitat in Pahranagat Valley. One notable difference under cumulative pumping with Alternative B is that a higher number of springs with aquatic biological resources are affected at the full build out model time frame compared to the Proposed Action.

Cumulative pumping with Alternative B could affect habitat for four federally listed fish species, White River spinedace, Pahrump poolfish, Big Springs spinedace, and Moapa dace. Alternative B only would contribute effects to two of these species, White River spinedace and Pahrump poolfish. Spring flow or water level reductions were determined at the following locations for these species:

- White River Spinedace – Although the 10-foot groundwater drawdown contours did not overlap with springs occupied by this species, the model simulation predicted cumulative flow reductions of 19, 30, and 39 percent for the 3 model time frames in the Flag Spring complex. Alternative B pumping would contribute most of the flow reductions, as indicated by predicted percentages of -19 to -37. Cumulative pumping with Alternative B could result in percent flow reductions in Preston Big Springs (-3 to -9 percent). Alternative B pumping would contribute a small portion of the reduction as indicated by percentages of 0 to -2.



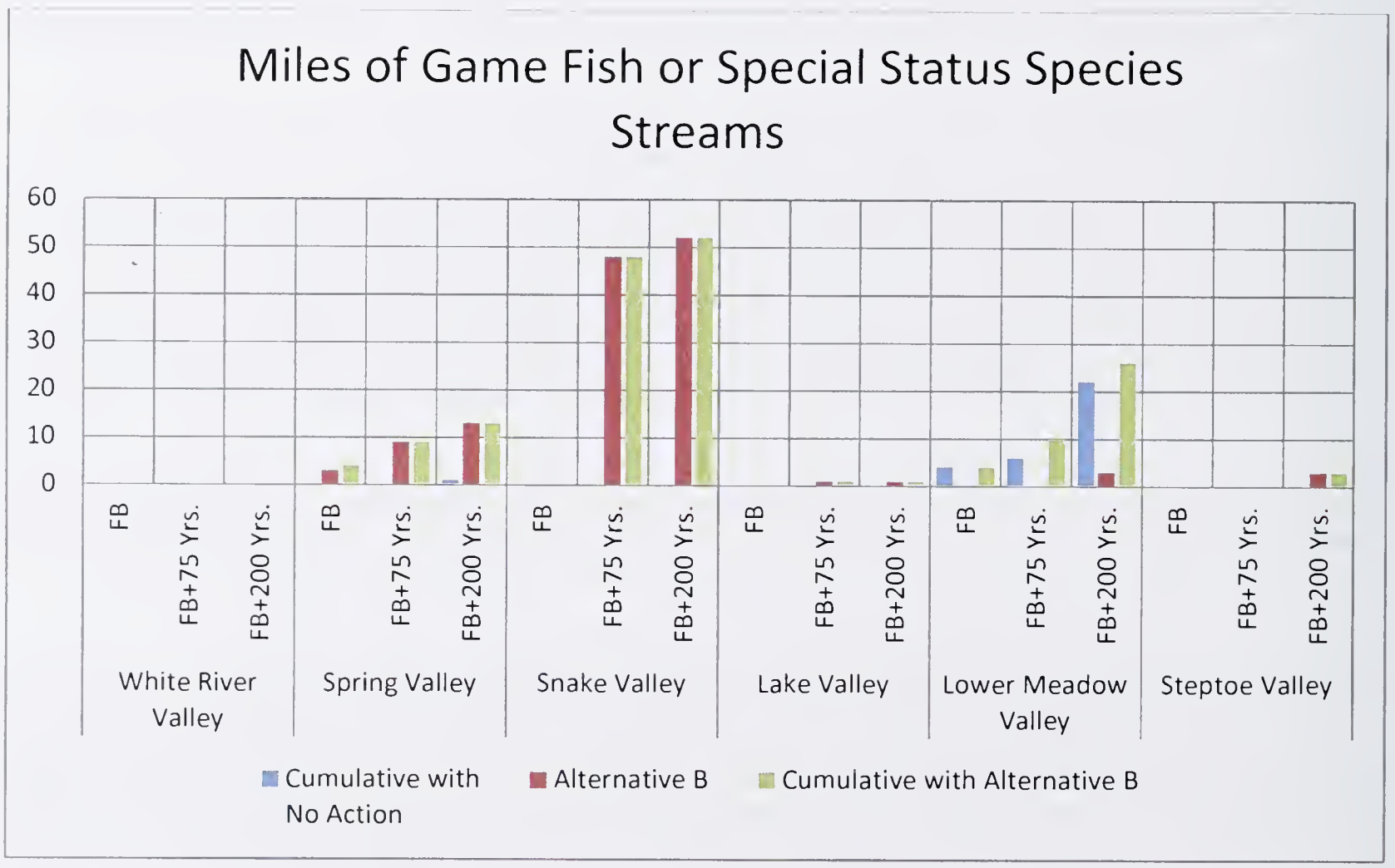


Figure 3.7-26 Cumulative Analysis with Alternative B and No Action Using Aquatic Biological Resource Impact Parameters

- Pahrump Poolfish – Potential water level reductions were predicted for all three model time frames in Shoshone Ponds. No information is available to quantify the potential flow reduction in the ponds. Alternative B would contribute all of the potential reduction in Shoshone Ponds.
- Big Springs Spinedace – No Action and other cumulative pumping actions would affect flows in Meadow Valley Wash in Panaca Valley (0.4 mile) and Dry Valley (0.1 mile). Alternative B pumping would not contribute reduced flows in Meadow Valley Wash.
- Moapa Dace – Cumulative pumping with No Action would likely result in flow reductions in the Muddy River. Alternative B would not contribute to these effects on habitat for this species. Model-predicted cumulative flow reductions were shown for all 3 model time frames, with percentages ranging from -37 to -62. The percent reduction for Alternative B pumping was 0 to -1.
- Other Federally Listed Species – Cumulative pumping with Alternative B would not affect habitat for the following species: Hiko White River springfish (Hiko and Crystal springs), White River springfish (Ash Spring), and Pahranagat roundtail chub (Pahranagat Creek). Model-simulated flow reductions of 0 to 5 percent were predicted for Ash and Crystal springs for the 3 model periods.

Cumulative pumping with Alternative B would contribute risks in habitat reductions for other special status fish, amphibians (northern leopard frog), and invertebrates (springsnails and California floater) in these seven basins. Total loss of habitat could occur in South Millick Spring in Spring Valley and Big Springs in Snake Valley. Specific waterbodies and their associated species at risk are provided in **Appendix F**, **Tables F3.7-30** and **F3.7-31**. In total, 8 to 28 springs with game fish or special status species could be affected by cumulative pumping in these 7 basins at the 3 model time frames. Cumulative effects on stream habitat for game fish or special status aquatic species would range from 26 to 122 miles for the 3 model time frames.

In GBNP, Alternative B could contribute to cumulative effects to three springs (Rowland, Outlet, and Outhouse) and four streams (Baker, Lehman, Snake, and Strawberry creeks) and associated aquatic species. In Utah, the same springs and streams could be affected, as discussed for cumulative pumping with the Proposed Action. Flow data are not available to predict the percent flow reduction for these aquatic habitats. Additional streams at risk include Shingle and Williams Canyon creeks in Spring Valley, based on the Elliott et al. (2006) study.

Cumulative pumping with Alternative B could conflict with conservation agreements for Bonneville cutthroat and northern leopard frog in Spring and Snake valleys and recovery plans for Pahrump poolfish and White River spinedace in Spring and White River valleys, respectively.

The availability of native and non-native fish species traditionally used for food by regional Tribes in relation to groundwater drawdown also could be affected in all seven basins identified above regarding cumulative effects on game fish or special status fish species.

3.7.3.9 Alternative C

Right-of-ways and Groundwater Development Area Construction and Maintenance

The effects of Alternative C surface disturbance resulting from ROWs and project facilities in combination with other cumulative actions on aquatic biological resources would be the same as discussed for cumulative impacts with the Proposed Action.

Groundwater Pumping Effects

Detailed results of the cumulative pumping analysis with Alternative C are provided in **Appendix F**, **Tables F3.7-32** and **F3.7-33** for springs/ponds/lakes and streams, respectively. The cumulative analysis focused on the incremental pumping effects that would be contributed by the Alternative C in combination with other cumulative pumping activities. In total, 6 to 13 basins with aquatic biological resources would be affected by this cumulative analysis for the 3 model time frames. However, only three of these basins would be affected by Alternative C: White River, Spring (#184), and Snake valleys.

Percent flow reduction and impact indicator information are summarized in **Appendix F**, **Table F3.7-43**. Using model-simulated flow information, the magnitude of effects on reduced habitat would be lower in White River and

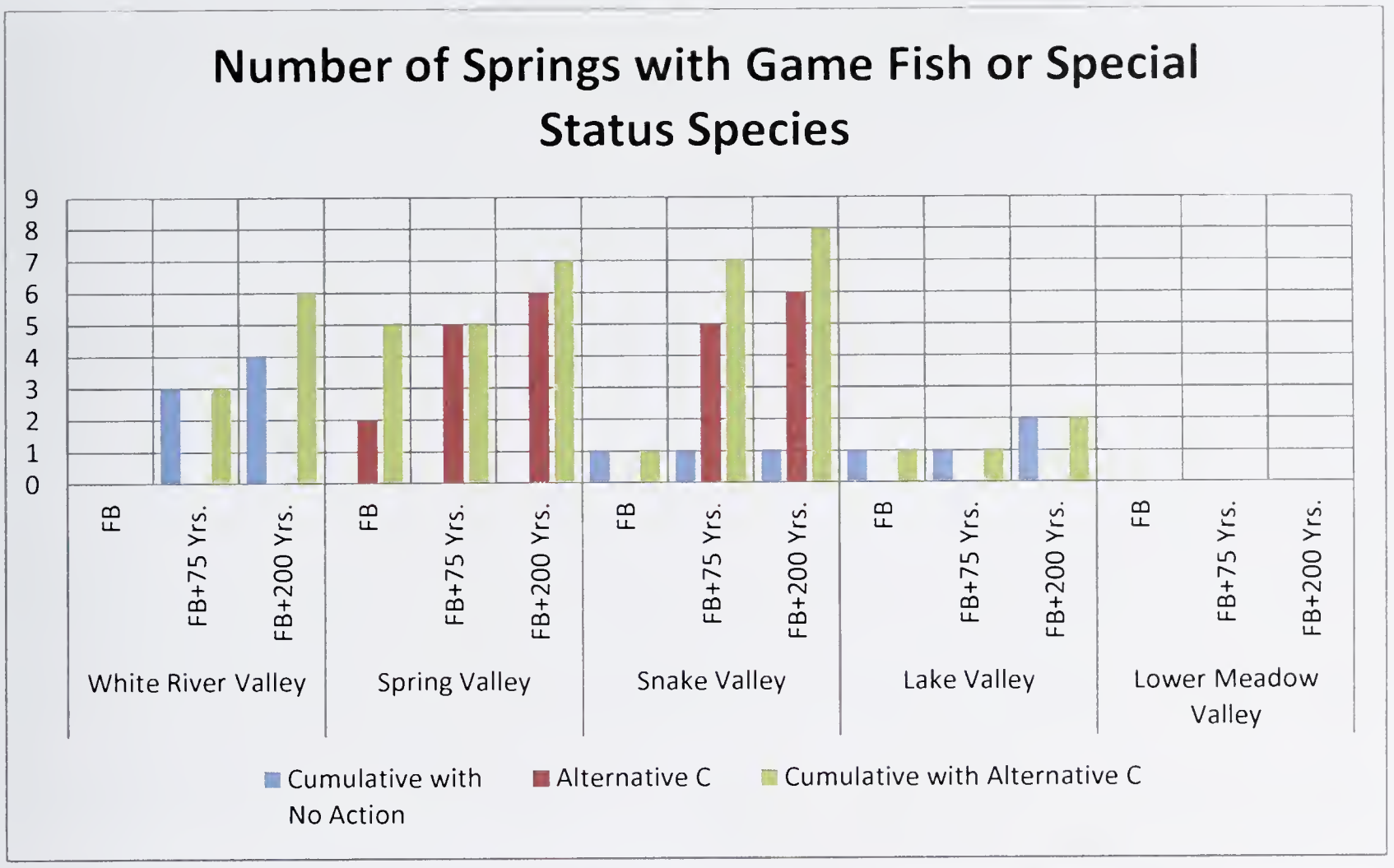
Spring valleys in comparison to the Proposed Action. Based on the model-simulated flow predictions for Big Spring, the flow reduction would be similar for cumulative pumping with the Proposed Action and Alternative C.

The relative contribution of Alternative C to cumulative effects on aquatic habitat is shown in **Figure 3.7-27**. The figure includes impact parameter information for cumulative with No Action, Alternative C, and cumulative pumping with Alternative C. Alternative C would contribute a substantial portion of reduced habitat in Spring and Snake valleys. There would be more equal contribution of incremental effects from No Action and Alternative C in White River Valley. No Action pumping contributes most of the effects on habitat in Pahranagat Valley and Lake Valley and all of the effects in Lower Meadow Valley Wash. One notable difference under cumulative pumping with Alternative C is that a lower number of spring and stream habitats would be affected in Spring Valley compared to the Proposed Action. The number of spring and stream habitat is similar in the other five valleys when comparing cumulative pumping with Alternative C and the Proposed Action.

Cumulative pumping with Alternative C could affect habitat for four federally listed fish species, White River spinedace, Pahrump poolfish, Big Springs spinedace, and Moapa dace. Alternative C only would contribute effects to two of these species, White River spinedace and Pahrump poolfish. Spring flow or water level reductions were determined at the following locations for these species:

- White River Spinedace – Although the 10-foot groundwater drawdown contours did not overlap with springs occupied by this species, the model simulation predicted cumulative flow reductions of 1, 4, and 8 percent for the 3 model time frames in the Flag Spring complex. Alternative C pumping would contribute most of the percent flow reductions in this spring (-1 to -5). Cumulative pumping could result in percent flow reductions in Preston Big Springs of 2 to 7 percent. Alternative C would not contribute to the predicted flow reduction in Preston Big Springs.
- Pahrump Poolfish – Potential water level reductions were predicted for all three model time frames in Shoshone Ponds. No information is available to quantify the potential flow reduction in the ponds. Alternative C would contribute all of the potential reduction in Shoshone Ponds.
- Big Springs Spinedace – No Action and other cumulative pumping actions could reduce flows in Meadow Valley Wash in Panaca Valley (0.1 mile). Potential flow reductions and reduced habitat were predicted at the full build out plus 200 years time frame. Alternative C pumping would not contribute to pumping effects on Meadow Valley Wash.
- Moapa Dace – Cumulative pumping with No Action would likely result in flow reductions in the Muddy River. Alternative C would not contribute to these effects on habitat for this species. Model-predicted flow reductions were shown for all 3 model time frames, with percentages ranging from -37 to -65.
- Other Federally Listed Species – Cumulative pumping with Alternative C would not affect habitat for the following species: Hiko White River springfish (Hiko and Crystal springs), White River springfish (Ash Spring), and Pahranagat roundtail chub (Pahranagat Creek). Model-simulated flow reductions of 0 to 4 percent were predicted for Ash and Crystal springs for the three model periods.

Cumulative pumping with Alternative C would likely contribute risks for habitat reductions for other special status fish, amphibians (northern leopard frog), and invertebrates (springsnails and California floater) in these six basins. Total loss of habitat could occur in Big Springs in Snake Valley, based on model-predicted flow changes. Specific waterbodies and their associated species at risk are provided in **Appendix F**, **Tables F3.7-32** and **F3.7-33**. In total, 6 to 25 springs with game fish or special status species could be affected by cumulative pumping in these 3 basins at the 3 model time frames. Cumulative effects on stream habitat for game fish or special status aquatic species would range from 25 to 102 miles for the 3 model time frames.



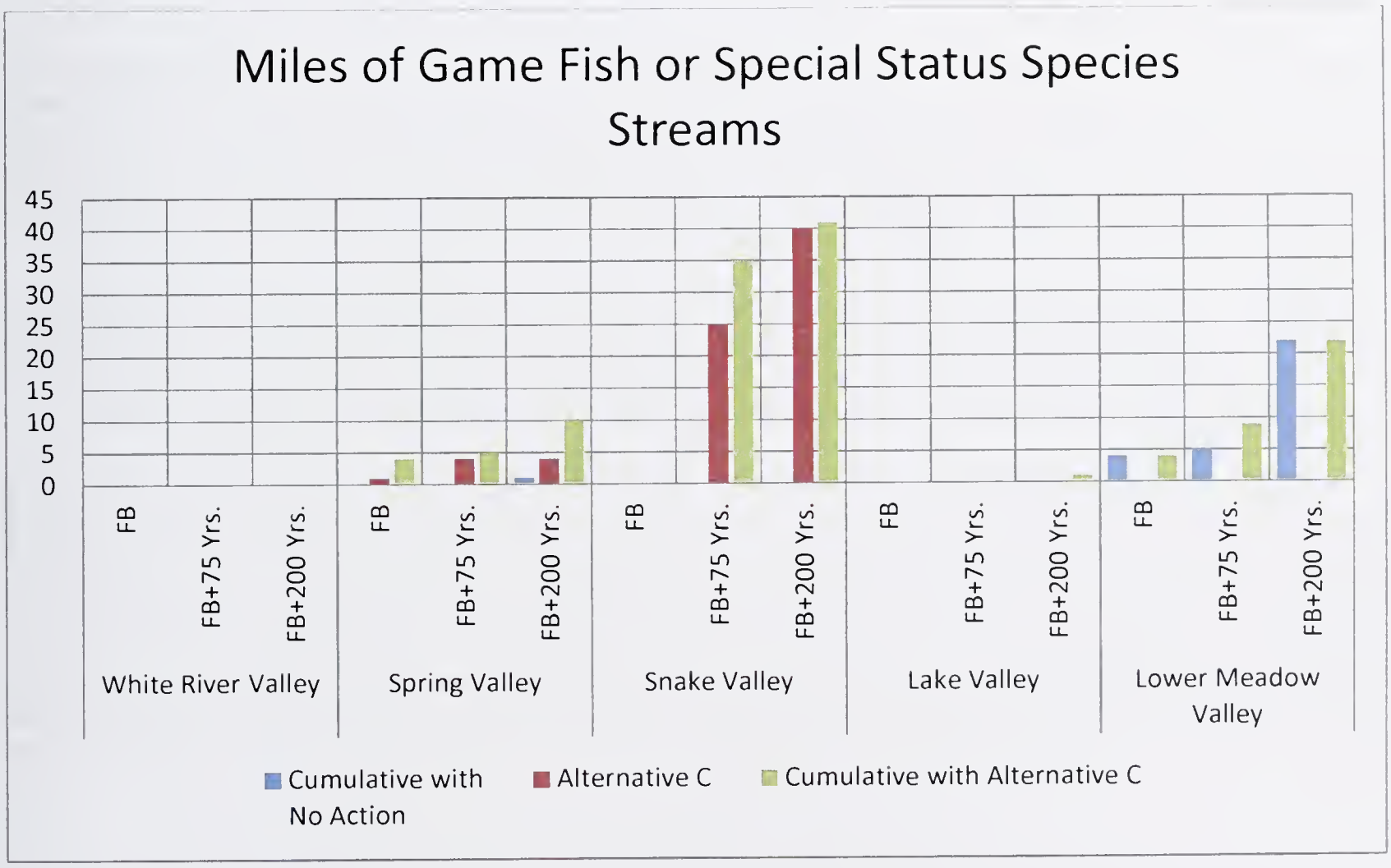


Figure 3.7-27 Cumulative Analysis with Alternative C and No Action Using Aquatic Biological Resource Impact Parameters

In GBNP, Alternative C could contribute to cumulative effects to three springs (Rowland and Outhouse) and two streams (Lehman and Snake creeks) and associated aquatic species. Additional streams at risk in GBNP include Shingle and Williams Canyon creeks in Spring Valley and Strawberry Creek in Snake Valley, based on the Elliott et al. (2006) study. In Utah, the same springs and streams would be affected, as discussed for cumulative pumping with the Proposed Action. Flow data are not available to predict the percent flow reduction for these aquatic habitats. Cumulative pumping with Alternative C could conflict with conservation agreements for Bonneville cutthroat and northern leopard frog in Spring and Snake valleys and recovery plans for Pahrump poolfish and White River spinedace in Spring and White River valleys, respectively.

The availability of fish species traditionally used for food by regional Tribes in relation to groundwater drawdown also could be affected in all six basins identified above regarding cumulative effects on game fish or special status fish species.

3.7.3.10 Alternative D

Right-of-ways and Groundwater Development Area Construction and Maintenance

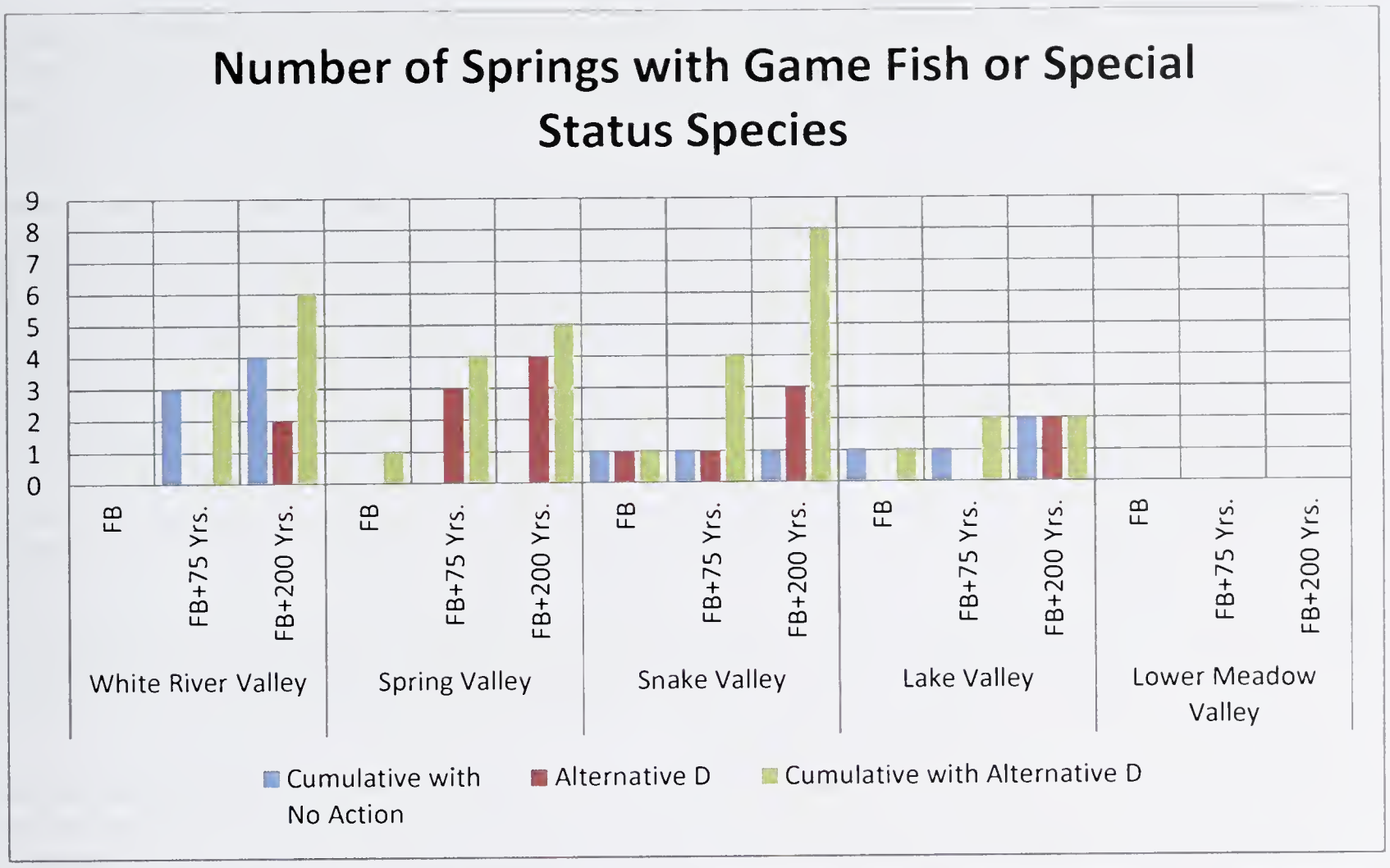
Construction and facility maintenance in Snake Valley and White Pine County would be eliminated under Alternative D. As a result, construction of the remaining ROWs and project facilities in Lincoln and Clark County and the Lincoln County portion of Spring Valley would result in effects on intermittent streams. No perennial streams or springs would be crossed by this alternative. Therefore, Alternative D impacts would contribute low level impacts after ACMs and additional mitigation in combination with past effects from grazing. Other past and future cumulative actions involving linear ROWs, wind projects, and the Kane Springs Valley Groundwater Development have or will result in surface disturbance and sedimentation impacts to streams and springs located in other portions of the cumulative effects study area. Alternative D would contribute minor impacts to the overall cumulative effects area due to the fact that no perennial streams or springs are affected.

Groundwater Pumping Effects

Detailed results of the cumulative pumping analysis with Alternative D are provided in **Appendix F**, **Tables F3.7-34** and **F3.7-35** for springs/ponds/lakes and streams, respectively. The cumulative analysis focused on the incremental pumping effects that would be contributed by the Alternative D in combination with other cumulative pumping activities. In total, 5 to 13 basins with aquatic biological resources would be affected by this cumulative analysis for the three model time frames. However, only six of these basins would be affected by Alternative D: White River, Spring (#184), Snake, Lake, Pahranagat, and Lower Meadow Valley Wash.

Percent flow reduction and impact indicator information are summarized in **Appendix F**, **Table F3.7-44**. Using model-simulated flow information, the magnitude of effects on reduced habitat would be considerably lower in White River and Spring valleys in comparison to the Proposed Action. Based on the model-simulated flow predictions for Big Spring, the flow reduction would be similar for cumulative pumping with the Proposed Action and Alternative D.

The relative contribution of Alternative D to cumulative effects on aquatic habitat is shown in **Figure 3.7-28**. The figure includes impact parameter information for cumulative with No Action, Alternative D, and cumulative pumping with Alternative D. Alternative D would contribute a substantial portion of reduced habitat in Snake and Spring valleys. This pattern is most evident in Snake Valley at the full build out plus 200 years time frame. There would be more equal contribution of incremental effects from No Action and Alternative D in White River and Lake valleys. No Action pumping contributes all of the effects on habitat in Pahranagat Valley and Lower Meadow Valley Wash. One notable difference under cumulative pumping with Alternative D is that a lower number of spring and stream habitats would be affected in Spring and Snake valleys compared to the Proposed Action. The number of spring and stream habitats is similar in the other five valleys when comparing cumulative pumping with Alternative D and the Proposed Action.



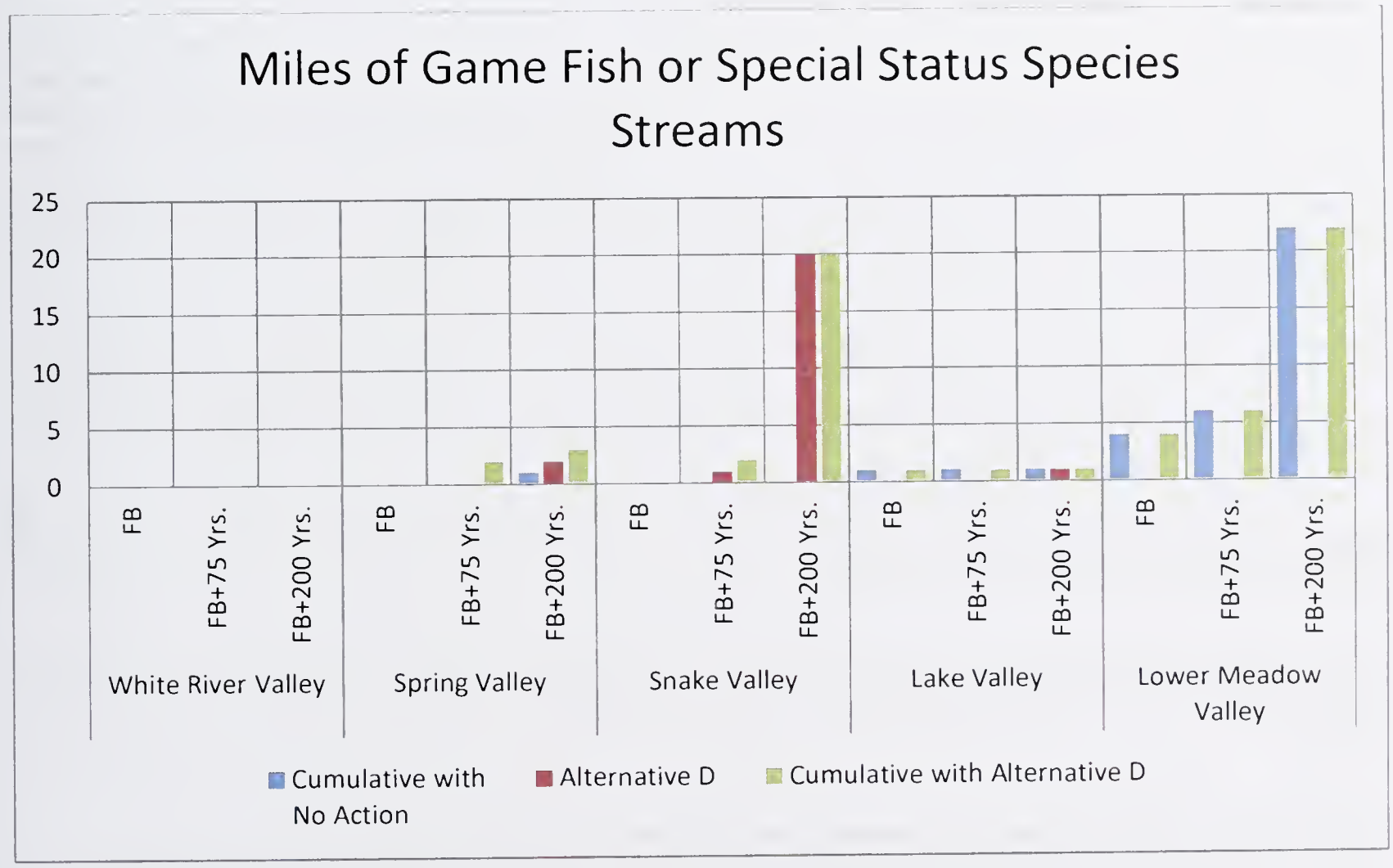


Figure 3.7-28 Cumulative Analysis with Alternative D and No Action Using Aquatic Biological Resource Impact Parameters

Cumulative pumping with Alternative D could affect habitat for four federally listed fish species, White River spinedace, Pahrump poolfish, Big Springs spinedace, and Moapa dace. Alternative D only would contribute effects to two of these species, White River spinedace and Pahrump poolfish. Spring flow or water level reductions were determined at the following locations for these species:

- White River Spinedace – Although the 10-foot groundwater drawdown contours did not overlap with springs occupied by this species, the model simulation predicted cumulative flow reductions of 1, 5, and 11 percent for the 3 model time frames in the Flag Spring complex. Most of the flow reduction would result from Alternative D, as indicated by a percent change of 0 to -9. Cumulative pumping could result in percent flow reductions in Preston Big Springs of 2 to 7 percent. None of this reduction would be caused by Alternative D pumping.
- Pahrump Poolfish – Potential water level reductions were predicted for the full build out plus 75 years and full build out plus 200 years time frame in Shoshone Ponds. No information is available to quantify the potential flow reduction in the ponds. Alternative D would contribute all of the potential reduction in Shoshone Ponds.
- Big Springs Spinedace – No Action and other cumulative pumping actions would likely affect flows in Meadow Valley Wash in Dry Valley (0.1 mile) at the full build out plus 200 years time frame. Alternative D pumping would not contribute to reduced flows in Meadow Valley Wash in Panaca Valley.
- Moapa Dace – Cumulative pumping with No Action would likely result in flow reductions in the Muddy River. Alternative D would not contribute to these effects on habitat for this species. Model-predicted cumulative flow reductions were shown for all three model time frames, with percentages ranging from -36 to -61. None of the predicted reduction would be caused by Alternative D.
- Other Federally Listed Species – Cumulative pumping with Alternative D would not affect habitat for the following species: Hiko White River springfish (Hiko and Crystal springs), White River springfish (Ash Spring), and Pahranagat roundtail chub (Pahranagat Creek). Model-simulated flow reductions of 0 to 4 percent were predicted for Ash and Crystal springs for the 3 model periods.

Cumulative pumping with Alternative D would likely contribute risks in habitat reductions for other special status fish, amphibians (northern leopard frog), and invertebrates (springsnails and California floater) in these three basins. Total loss of habitat could occur in Big Springs in Snake Valley, based on model-predicted flow changes. Specific waterbodies and their associated species at risk are provided in **Appendix F**, **Tables 3.7-34** and **3.7-35**. In total, 2 to 17 springs with game fish or special status species could be affected by cumulative pumping in these 6 basins at the 3 model time frames. Cumulative effects on stream habitat for game fish or special status aquatic species would range from 20 to 74 miles for the 3 model time frames.

Alternative D could contribute to cumulative effects to one spring (Outhouse) and one stream (Snake Creek) and associated aquatic species in the GBNP. In Utah, one spring (Stateline) and one stream (Lake Creek) could be affected, as discussed for cumulative pumping with the Proposed Action. Flow data are not available to predict the percent flow reduction for these aquatic habitats.

Cumulative pumping with Alternative D could conflict with conservation agreements for Bonneville cutthroat and northern leopard frog in Spring and Snake valleys and recovery plans for Pahrump poolfish and White River spinedace in Spring and White River valleys, respectively.

The availability of fish species traditionally used for food by regional Tribes in relation to groundwater drawdown also could be affected in all six basins identified above regarding cumulative effects on game fish or special status fish species.

3.7.3.11 Alternative E

Right-of-ways and Groundwater Development Area Construction and Maintenance

Under Alternative E, surface disturbance impacts would be limited to intermittent streams crossed by ROWs that would exclude Snake Valley. These impacts would be considered low level due to the implementation of BMPs and ACMs to reduce water quality effects involving sedimentation and potential fuel spills. Other past and future cumulative actions involving linear ROWs, wind projects, and groundwater development have or will result in surface disturbance and sedimentation impacts to waterbodies located in other portions of the cumulative effects study area. Alternative E

would contribute minor impacts to the overall cumulative effects area due to the fact that no perennial streams or springs are affected.

Groundwater Pumping Effects

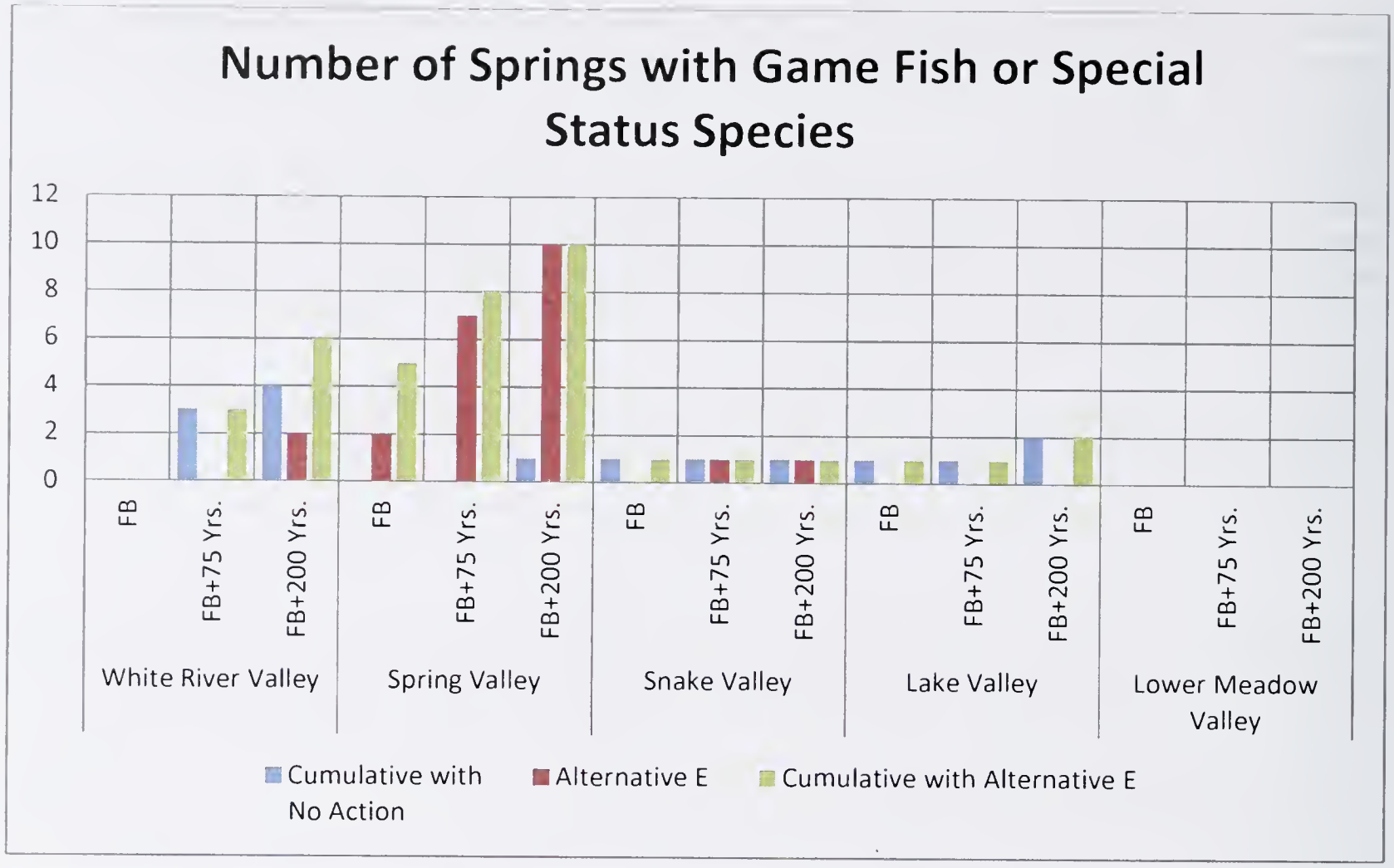
Detailed results of the cumulative pumping analysis with Alternative E are provided in **Appendix F**, **Tables F3.7-36** and **F3.7-37** for springs/ponds/lakes and streams, respectively. The cumulative analysis focused on the incremental pumping effects that would be contributed by the Alternative E in combination with other cumulative pumping activities. In total, 5 to 13 basins with aquatic biological resources would be affected by this cumulative analysis for the 3 model time frames. However, only five of these basins would be affected by Alternative E: White River, Spring (#184), Snake, Lake, and Spring (#201).

Percent flow reduction and impact indicator information are summarized in **Appendix F**, **Table F3.7-45**. Using model-simulated flow information, the magnitude of effects on reduced habitat would be considerably lower in White River and Spring valleys in comparison to the Proposed Action. Based on the model-simulated flow predictions for Big Spring, the flow reduction would be similar for cumulative pumping with the Proposed Action and Alternative E.

The relative contribution of Alternative E to cumulative effects on aquatic habitat is shown in **Figure 3.7-29**. The figure includes impact parameter information for cumulative with No Action, Alternative E, and cumulative pumping with Alternative E. Alternative E would contribute a substantial portion of reduced habitat in Spring Valley. There would be more equal contribution of incremental effects from No Action and Alternative E in White River, Snake, and Lake valleys. No Action pumping would contribute all of the effects on habitat in Pahranagat Valley and Lower Meadow Valley Wash. One notable difference under cumulative pumping with Alternative E is that a lower number of spring and stream habitats would be affected in Snake Valley compared to the Proposed Action. The number of spring and stream habitat is similar in the other five valleys when comparing cumulative pumping with Alternative E and the Proposed Action.

Cumulative pumping with Alternative E could affect habitat for four federally listed fish species, White River spinedace, Pahrump poolfish, Big Springs spinedace, and Moapa dace. Alternative E only would contribute effects to two of these species, White River spinedace and Pahrump poolfish. Spring flow or water level reductions were determined at the following locations for these species:

- White River Spinedace – Although the 10-foot groundwater drawdown contours did not overlap with springs occupied by this species, the model simulation predicted cumulative flow reductions of 1, 5, and 11 percent for the 3 model time frames in the Flag Spring complex. Most of the predicted reduction would be caused by Alternative E pumping (-1 to -8 percent). Model simulations indicate that cumulative pumping would result percent flow reductions in Preston Big Springs of 2 to 8 percent. A very small portion of this reduction would be caused by Alternative E pumping (0 to -1 percent).
- Pahrump Poolfish – Potential water level reductions were predicted for the full build out plus 75 years and full build out plus 200 years time frame in Shoshone Ponds. No information is available to quantify the potential flow reduction in the ponds. Alternative E would contribute all of this potential reduction in Shoshone Ponds.
- Big Springs Spinedace – No Action and other cumulative pumping actions could reduce flows in Meadow Valley Wash in Dry Valley (0.1 mile) at the full build out plus 200 years time frame. Alternative E pumping would not contribute reduced flow to Meadow Valley Wash in Panaca Valley.
- Moapa Dace – Cumulative pumping with No Action would likely result in flow reductions in the Muddy River. Alternative E would not contribute to these effects on habitat for this species. Model-predicted cumulative flow reductions were shown for all three model time frames, with percentages ranging from -37 to -61. Alternative E pumping would not contribute to his reduction.
- Other Federally Listed Species – Cumulative pumping with Alternative E would not affect habitat for the following species: Hiko White River springfish (Hiko and Crystal springs), White River springfish (Ash Spring), and Pahranagat roundtail chub (Pahranagat Creek). Model-simulated flow reductions would be 0 to 4 percent in Ash and Crystal springs for the 3 model periods.



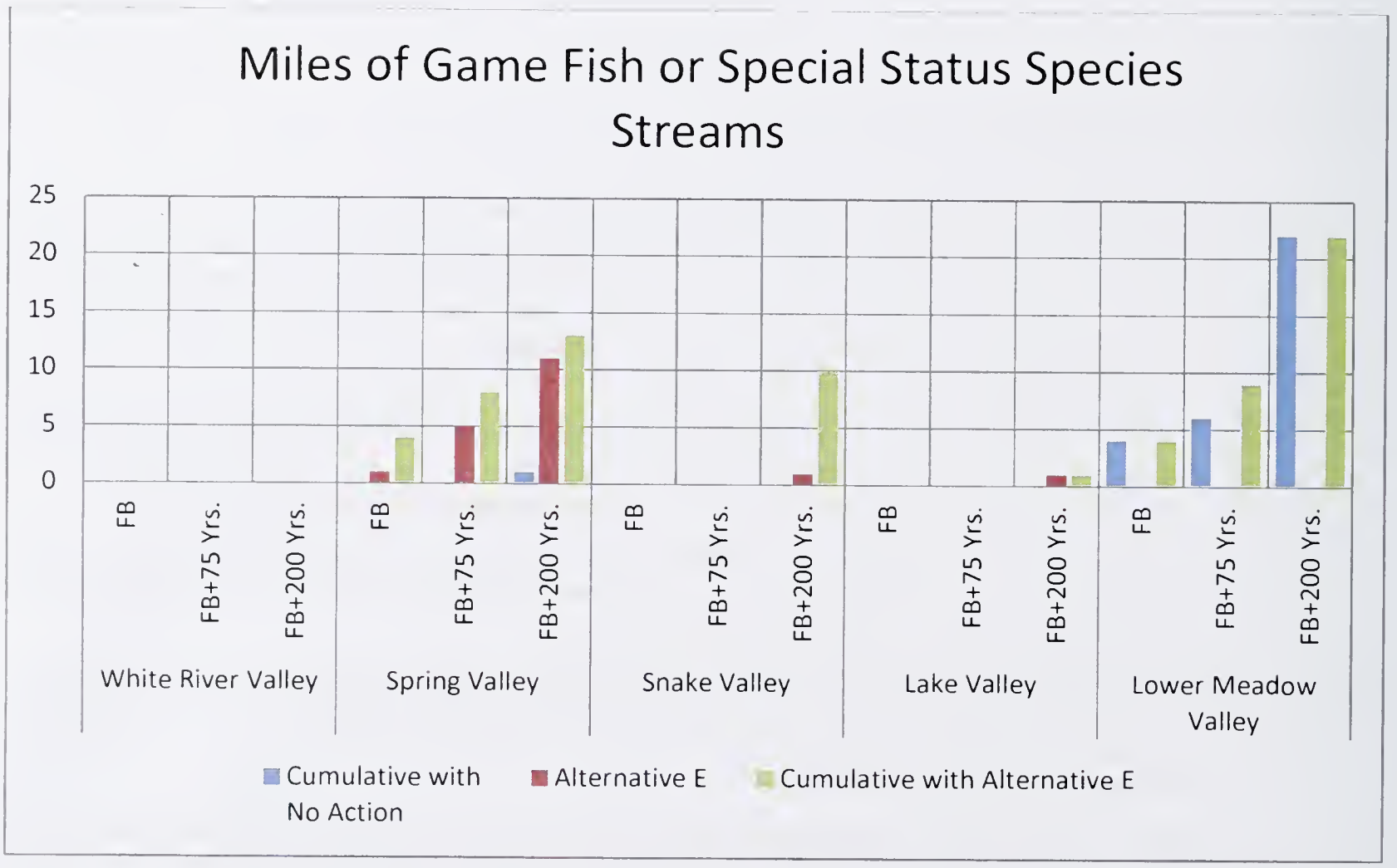


Figure 3.7-29 Cumulative Analysis with Alternative E and No Action Using Aquatic Biological Resource Impact Parameters

Cumulative pumping with Alternative E would contribute risks for habitat reductions for other special status fish, amphibians (northern leopard frog), and invertebrates (springsnails and California floater) in these five basins. Substantial loss of habitat could occur in Big Springs in Snake Valley, based on model-predicted flow reductions of 82 percent. Specific waterbodies and their associated species at risk are provided in **Appendix F**, **Tables 3.7-34** and **3.7-35**. In total, 6 to 21 springs with game fish or special status species could be affected by cumulative pumping in these 5 basins at the 3 model time frames. Cumulative effects on stream habitat for game fish or special status aquatic species would range from 26 to 75 miles for the 3 model time frames.

Alternative E could contribute to cumulative effects to one spring (Outhouse) and one stream (Snake Creek) and associated aquatic species in the GBNP. In Utah, no springs and one stream (Lake Creek) could be affected, as discussed for cumulative pumping with the Proposed Action. Flow data are not available to predict the percent flow reduction for these aquatic habitats.

Cumulative pumping with Alternative E could conflict with conservation agreements for Bonneville cutthroat and northern leopard frog in Spring and Snake valleys and recovery plans for Pahrump poolfish and White River spinedace in Spring and White River valleys, respectively.

The availability of fish species traditionally used for food by regional Tribes in relation to groundwater drawdown also could be affected in all six basins identified above regarding cumulative effects on game fish or special status fish species.

3.7.3.12 Alternative F

Right-of-ways and Groundwater Development Area Construction and Maintenance

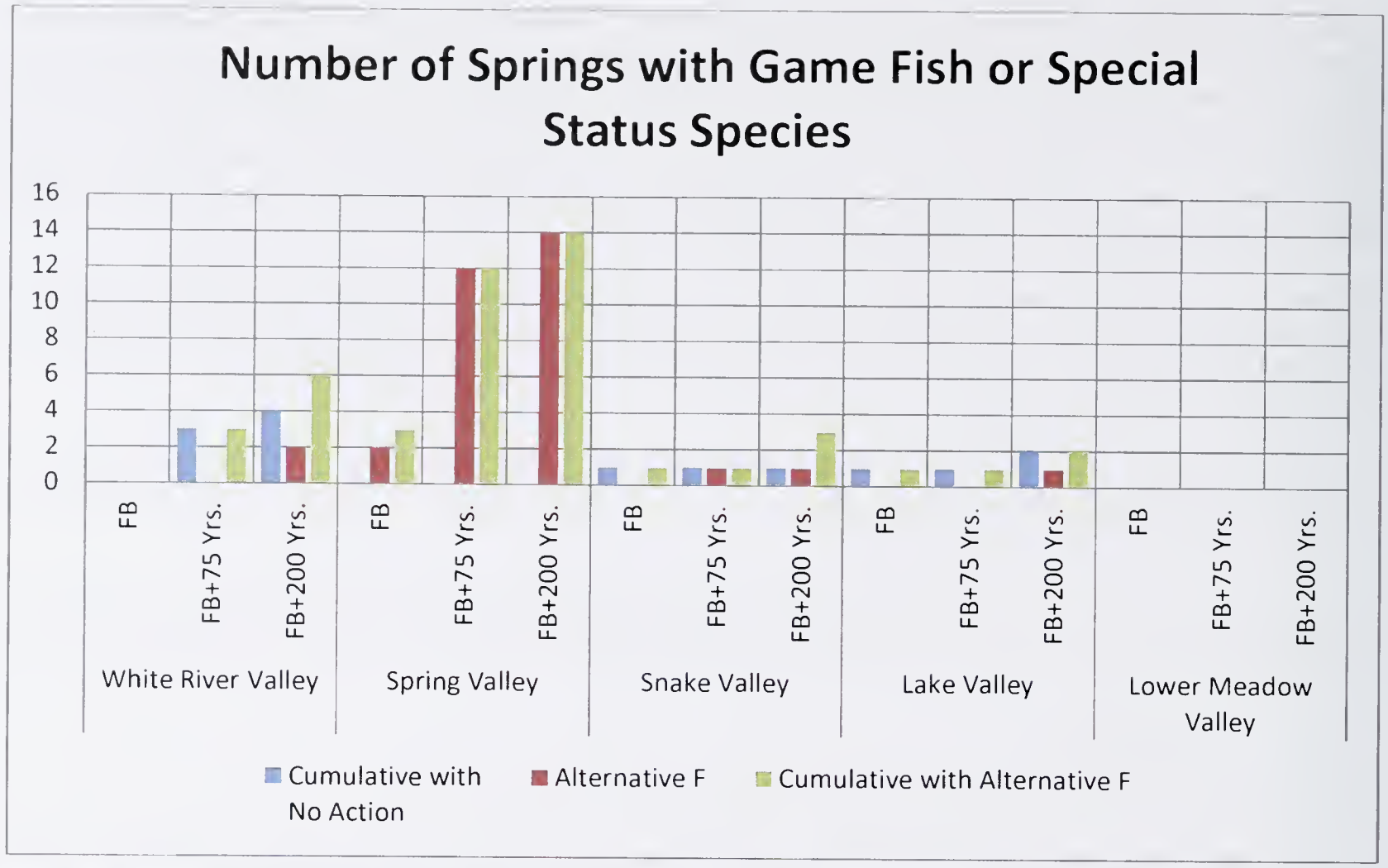
Under Alternative F, surface disturbance impacts would be limited to intermittent streams crossed by ROWs that would exclude Snake Valley. These impacts would be minimized due to the implementation of BMPs and ACMs to reduce water quality effects involving sedimentation and potential fuel spills. Other past and future cumulative actions involving linear ROWs, wind projects, and groundwater development have or will result in surface disturbance and sedimentation impacts to waterbodies located in other portions of the cumulative effects study area. Alternative F would not contribute impacts to the overall cumulative effects area due to the fact that no perennial streams or springs are affected.

Groundwater Pumping Effects

Detailed results of the cumulative pumping analysis with Alternative F are provided in **Appendix F**, **Tables F3.7-40** and **F3.7-41** for springs/ponds/lakes and streams, respectively. The cumulative analysis focused on the incremental pumping effects that would be contributed by the Alternative F in combination with other cumulative pumping activities. In total, 7 to 13 basins with aquatic biological resources would be affected by this cumulative analysis for the 3 model time frames. However, only five of these basins would be affected by Alternative F: White River, Spring (#184), Snake, Lake, and Pahranagat.

Percent flow reduction and impact indicator information are summarized in **Appendix F**, **Table F3.7-50**. Using model-simulated flow information, the magnitude of effects on reduced habitat would be considerably lower in White River and Spring valleys in comparison to the Proposed Action. Based on the model-simulated flow predictions for Big Springs, the flow reduction would be similar for cumulative pumping with the Proposed Action and Alternative F.

The relative contribution of Alternative F to cumulative effects on aquatic habitat is shown in **Figure 3.7-30**. The figure includes impact parameter information for cumulative with No Action, Alternative F, and cumulative pumping with Alternative F. Alternative F would contribute a substantial portion of reduced habitat in Spring Valley. There would be more equal contribution of incremental effects from No Action and Alternative F in White River, Snake, and Lake valleys. No Action pumping would contribute all of the effects on habitat in Pahranagat Valley and Lower Meadow Valley Wash. One notable difference under cumulative pumping with Alternative F is that a lower number of spring and stream habitats would be affected in Snake Valley compared to the Proposed Action. The number of spring and stream habitat is similar in the other five valleys when comparing cumulative pumping with Alternative F and the Proposed Action.



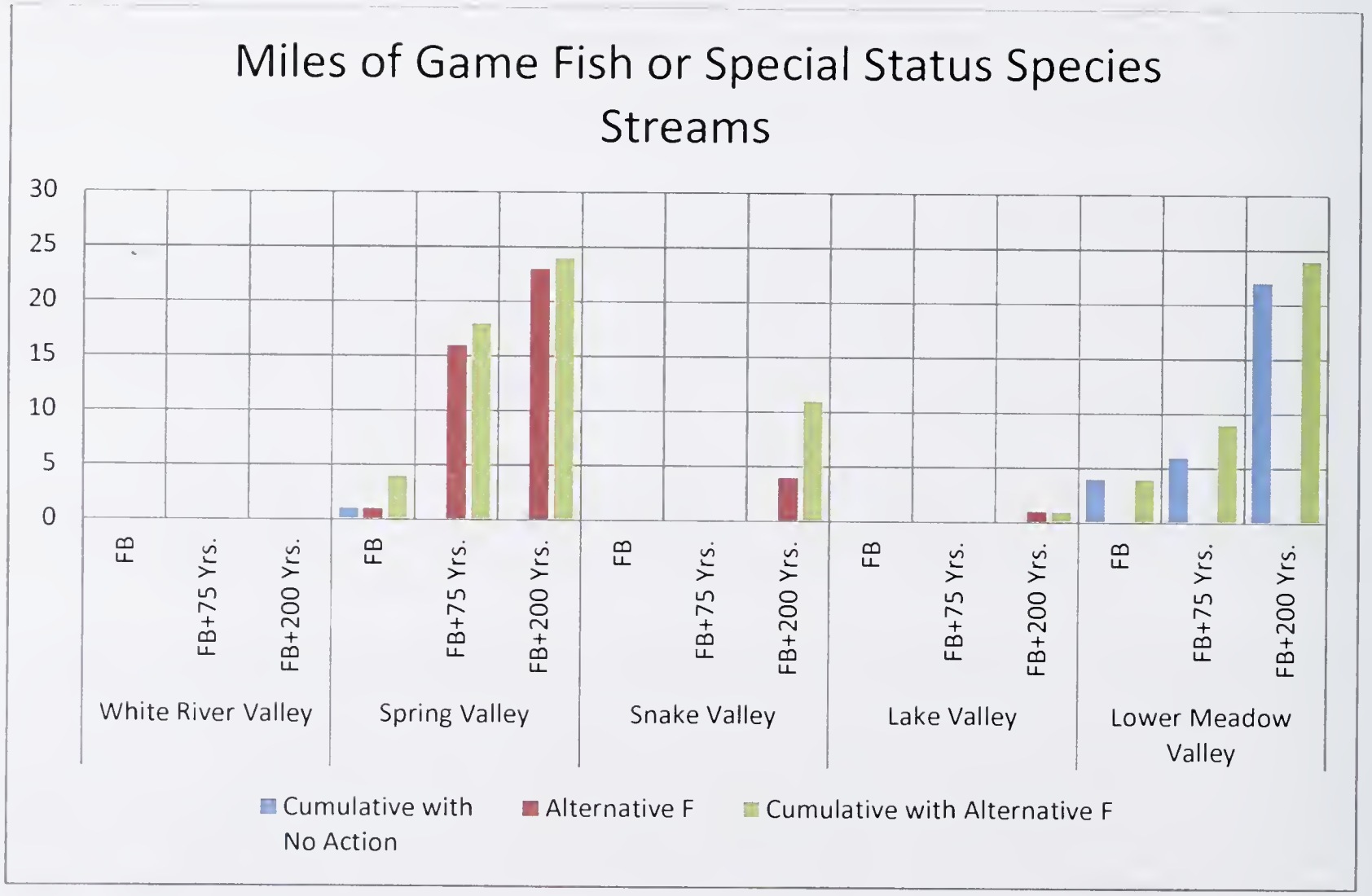


Figure 3.7-30 Cumulative Analysis with Alternative F and No Action Using Aquatic Biological Resource Impact Parameters

Cumulative pumping with Alternative F could affect habitat for four federally listed fish species, White River spinedace, Pahrump poolfish, Big Springs spinedace, and Moapa dace. Alternative F only would contribute effects to two of these species, White River spinedace and Pahrump poolfish. Spring flow or water level reductions were determined at the following locations for these species:

- White River Spinedace – Although the 10-foot groundwater drawdown contours did not overlap with springs occupied by this species, the model simulation predicted cumulative flow reductions of 1, 7, and 19 percent for the 3 model time frames in the Flag Spring complex. Most of the predicted reduction would be caused by Alternative F pumping (-1 to -16 percent). Model simulations indicate that cumulative pumping would result in percent flow reductions in Preston Big Springs of 2 to 8 percent. A very small portion of this reduction would be caused by Alternative F pumping (0 to -1 percent).
- Pahrump Poolfish – Potential water level reductions were predicted for the full build out plus 75 years and full build out plus 200 years time frame in Shoshone Ponds. No information is available to quantify the potential flow reduction in the ponds. Alternative F would contribute all of this potential reduction in Shoshone Ponds.
- Big Springs Spinedace – No Action and other cumulative pumping actions could reduce flows in Meadow Valley Wash in Dry Valley (0.1 mile) at the full build out plus 200 years time frame. Alternative F pumping would not contribute reduced flow to Meadow Valley Wash in Panaca Valley.
- Moapa Dace – Cumulative pumping with No Action would likely result in flow reductions in the Muddy River. Alternative F would not contribute to these effects on habitat for this species. Model-predicted cumulative flow reductions were shown for all 3 model time frames, with percentages ranging from -37 to -61. Alternative F pumping would not likely contribute to this reduction.
- Other Federally Listed Species – Cumulative pumping with Alternative F would not affect habitat for the following species: Hiko White River springfish (Hiko and Crystal springs), White River springfish (Ash Spring), and Pahranagat roundtail chub (Pahranagat Creek). Model-simulated cumulative flow reductions would be 0 to 5 percent in Ash, Crystal, and Hiko springs for the 3 model periods. Model-predicted flow reductions of 0 to 1 percent indicates a very small contribution from Alternative F pumping by itself.

Cumulative pumping with Alternative F would contribute risks for habitat reductions for other special status fish, amphibians (northern leopard frog), and invertebrates (springsnails and California floater) in these six basins. Specific waterbodies and their associated species at risk are provided in **Appendix F**, **Tables F3.7-40** and **F3.7-41**. In total, 7 to 31 springs with game fish or special status species could be affected by cumulative pumping in these 5 basins at the 3 model time frames. Cumulative effects on stream habitat for game fish or special status aquatic species would range from 26 to 89 miles for the 3 model time frames.

Alternative F could contribute to cumulative effects to one spring (Outhouse) and one stream (Snake Creek) and associated aquatic species in the GBNP. In Utah, no springs and one stream (Lake Creek) could be affected, as discussed for cumulative pumping with the Proposed Action. Flow data are not available to predict the percent flow reduction for these aquatic habitats.

Cumulative pumping with Alternative F could conflict with conservation agreements for Bonneville cutthroat and northern leopard frog in Spring and Snake valleys and recovery plans for Pahrump poolfish and White River spinedace in Spring and White River valleys, respectively.

The availability of fish species traditionally used for food by regional Tribes in relation to groundwater drawdown also could be affected in all six basins identified above regarding cumulative effects on game fish or special status fish species.

3.8 Land Use

3.8.1 Affected Environment

3.8.1.1 Overview

The primary land uses within the region of study are agriculture, grazing, and recreation. Land use categories are based on the Las Vegas and Ely RMPs (BLM 2008, 1998). Agriculture is addressed in this section; acres of soil designated as suitable for prime farmland, livestock grazing (including rangelands), and recreation are addressed in Sections 3.4, Soil Resources; 3.12, Rangelands and Grazing; and 3.9, Recreation; respectively. Land use categories also include areas of special designations by federal and state agencies. These categories are addressed in Section 3.14, Special Designations.

QUICK REFERENCE

ACEC – Area of Critical Environmental Concern

BARCAS – Basin and Range Carbonate-Rock Aquifer System

FLPMA – Federal Land Policy and Management Act

RFFA – Reasonably Foreseeable Future Actions

RMP – Resource Management Plan

ROD – Record of Decision

SWReGAP – Southwest Regional Gap Analysis Project

3.8.1.2 Region of Study

The region of study for land use includes the areas within 1-mile of the proposed and alternative ROWs and ancillary facilities and the groundwater development areas. The region of study for groundwater pumping includes the hydrologic basins associated with the groundwater model.

Land Ownership

Land ownership was identified from data maintained by the BLM. The federal government—primarily the BLM—is the primary administrator of land within the project vicinity. Other land owners include private entities and the State of Nevada. Other federal land owners within the project vicinity and groundwater drawdown areas include the USFS, NPS, and USFWS. **Figure 3.8-1** shows land ownership in the project vicinity.

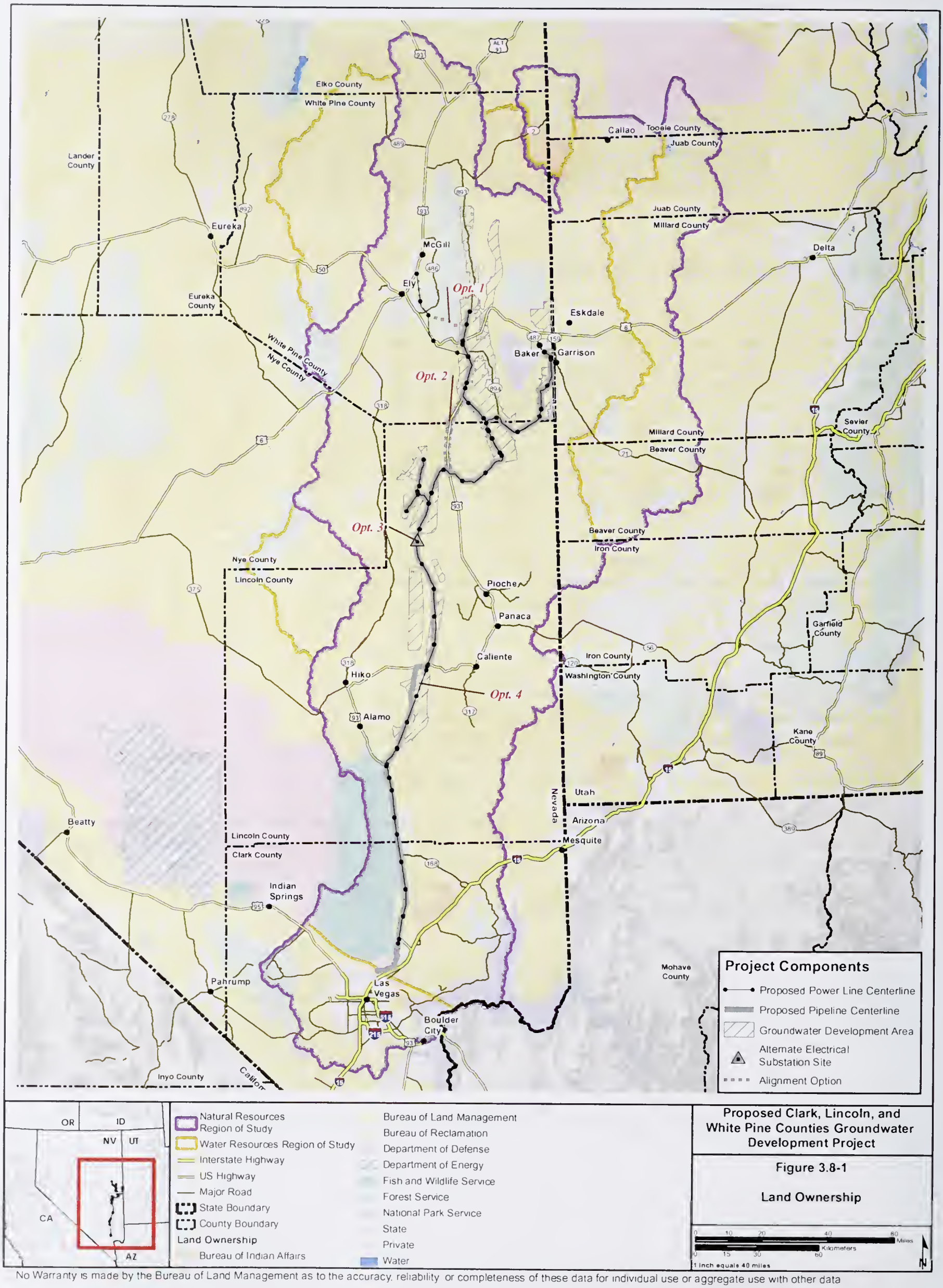
Through the RMP process, the BLM identifies areas for potential disposal to non-federal ownership under Section 102(a)(1) of the FLPMA. These areas remain in federal ownership until another entity pursues the acquisition of an identified area within the RMP planning period (typically 20 years or until the RMP is amended or revised). **Figure 3.8-2** shows areas that the BLM has identified for potential disposal to non-federal ownership in the project vicinity, all of which are managed by the Ely Field Office.

Zoning

Zoning data was obtained from the Clark County and Lincoln County Web sites (Clark County 2009, Lincoln County 2007). Zoning information for White Pine County was not available electronically. Zoning in the project vicinity is primarily rural residential and agricultural. Small areas in southern Lincoln County and in the more urban areas of Clark County are zoned for commercial and industrial uses. **Figure 3.8-3** shows zoning in the project vicinity.

Residential Lands

Residential areas were identified by using satellite and aerial imagery. Almost the entire project area is rural, so the residential areas primarily are low density.

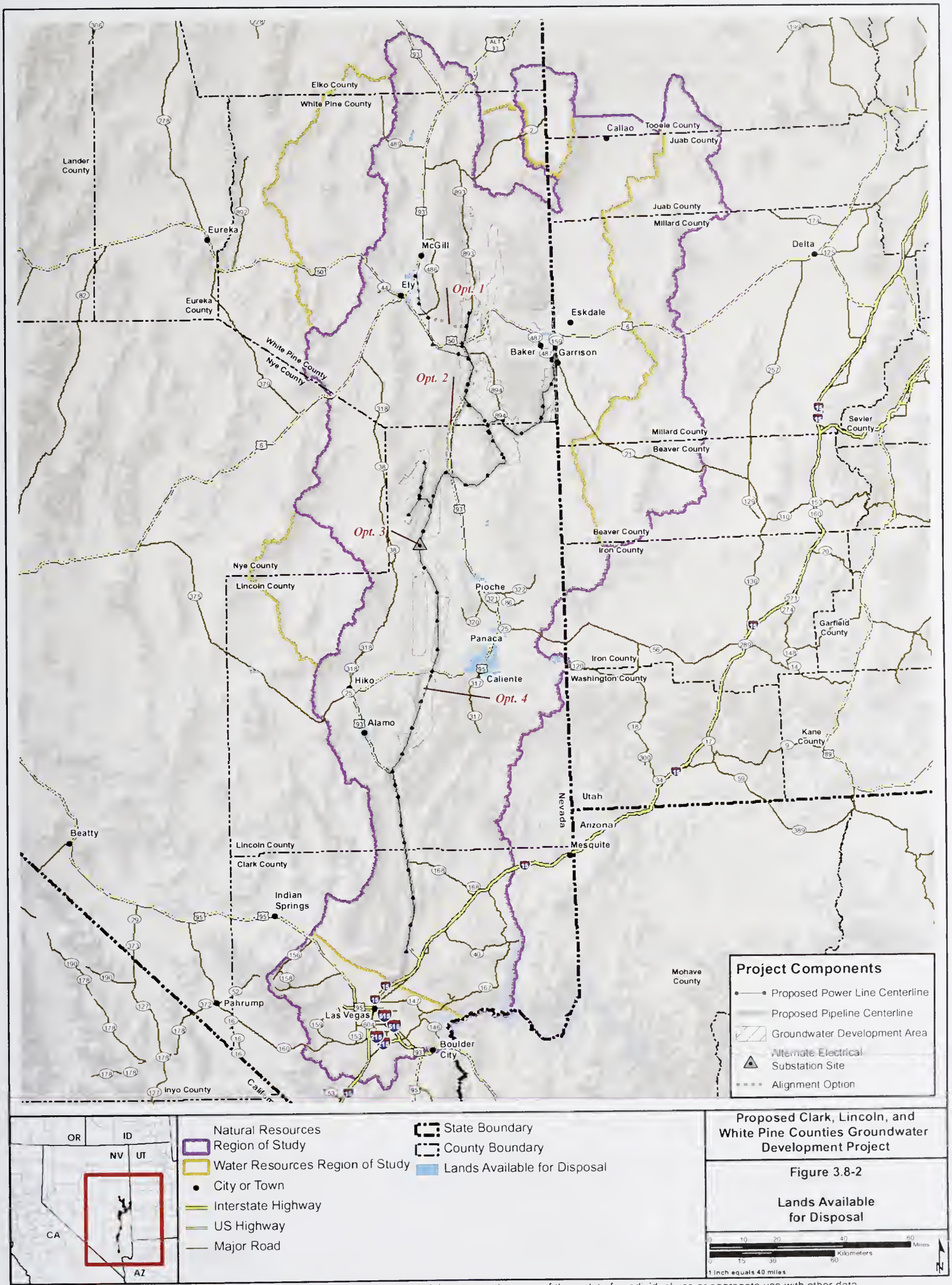


Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.8-1

Land Ownership

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual use or aggregate use with other data



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

No Zoning Data available for White Pine County

Eureka
Eureka County
White Pine County
Nye County
McGill
Ely
Opt. 1
Opt. 2
Opt. 3
Opt. 4
Juab County
Millard County
Delta
Eskdale
Baker
Garrison
Millard County
Beaver County
Beaver County
Iron County
Nye County
Lincoln County
Pioche
Panaca
Caliente
Hiko
Alamo
Iron County
Washington County
Garfiel
Count
Kane
County
Utah
Arizona
Nevada
Lincoln County
Clark County
Mesquite
Indian
Springs
Pahrump
Las
Vegas

Project Components

- Proposed Power Line Centerline
- Proposed Pipeline Centerline
- Groundwater Development Area
- Alternate Electrical Substation Site
- Alignment Option

OR ID NV UT CA AZ

- Natural Resources Region of Study
- Water Resources Region of Study
- Interstate Highway
- US Highway
- Major Road
- State Boundary
- County Boundary

Generalized Zoning

- Agriculture
- City Zoning
- Commercial
- General highway frontage district
- Industrial
- Limited resort and apartment district
- Mixed Use Residential and Commercial
- Open Space and Parks
- Public facility district
- Recreational Vehicle Park District
- Residential
- Rural Residential
- Special Industrial
- Special Use Overlay
- Urban village district

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.8-3

Generalized Zoning

0 8 16 32 48 Miles
0 12.5 25 50 Kilometers
1 inch equals 32 miles
N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

Agricultural Lands

Agricultural lands were identified through interpretations of aerial imagery and field investigations as documented in the BARCAS, SNWA, and SWReGAP studies (USGS 2007, SNWA 2007, Utah State University 2004). Agricultural lands were identified in the BARCAS study, a regional water-resource assessment, by combining areas of similar vegetation, water, and soil conditions. The BARCAS data was merged with phreatophytes identified by SNWA and areas classified as "agriculture" in the SWReGAP dataset. The data from the BARCAS study took primacy over data from SNWA followed by SWReGAP data to eliminate duplication.

Figure 3.8-4 shows the agricultural areas, which are all located on private lands. Agricultural acreage in the project vicinity is dedicated primarily to alfalfa-hay production, using center-pivot, wheel-line, or furrow-flood irrigation. Other land-cover types that are common to the area are scrub/shrub, herbaceous grasslands, and evergreen forests. A detailed description of land-cover types is provided in Section 3.5, Vegetation Resources.

Utility Corridors

Section 503 of FLPMA provides for the designation of utility corridors and encourages utilization of ROWs in-common to minimize environmental impacts and the proliferation of separate ROWs. It is BLM policy to encourage prospective applicants to locate their proposals within corridors (BLM 2008). However, all public land within the planning area [except where identified in the RMP as an avoidance or exclusion area] is available at the discretion of the agency for ROWs under the authority of FLPMA (BLM 1998 [RW-1-h]). Several utility corridors are located throughout White Pine, Lincoln, and Clark Counties (**Figure 3.8-5**). These corridors were identified using the BLM land use planning documents (BLM and SNWA 2008).

Right-of-way Exclusion and Avoidance Areas

The BLM designates areas of ROW exclusion and avoidance to protect resource values. ROW avoidance and exclusion areas in the project vicinity were established in the Ely and Las Vegas RMPs (BLM 2008, 1998). According to the BLM Land Use Planning Handbook (H-1601-1 Appendix C), ROW avoidance areas are to be avoided but may be available for location of ROWs with special stipulations whereas ROW exclusion areas are not available for location of ROWs under any conditions. According to the Ely RMP (BLM 2008), only facilities and uses that are consistent with the special designation associated with that area will be permitted in avoidance areas.

The Ely RMP (BLM 2008) identifies designated wilderness as exclusion areas (LR-41), WSAs as avoidance areas (LR-40), and specific ACECs as avoidance or exclusion areas (LR-42). The Las Vegas RMP (BLM 1998) identifies all ACECs and areas within a 0.25-mile of significant caves as ROW avoidance areas for linear ROWs (RW-1-e) except for the Hidden Valley District, Sloan Rock Art, and Big Dune ACECs which are identified as exclusion areas (RW-1-f). All ACECs in the Las Vegas Field Office are exclusion areas to site type ROWs, except within 0.5 mile of Federal Aid Highways (RW-1-g). Special designations (further discussed in Section 3.14, Special Designations) managed as avoidance or exclusion areas may be affected by the proposed project.

3.8.1.3 Right-of-way and Ancillary Facilities

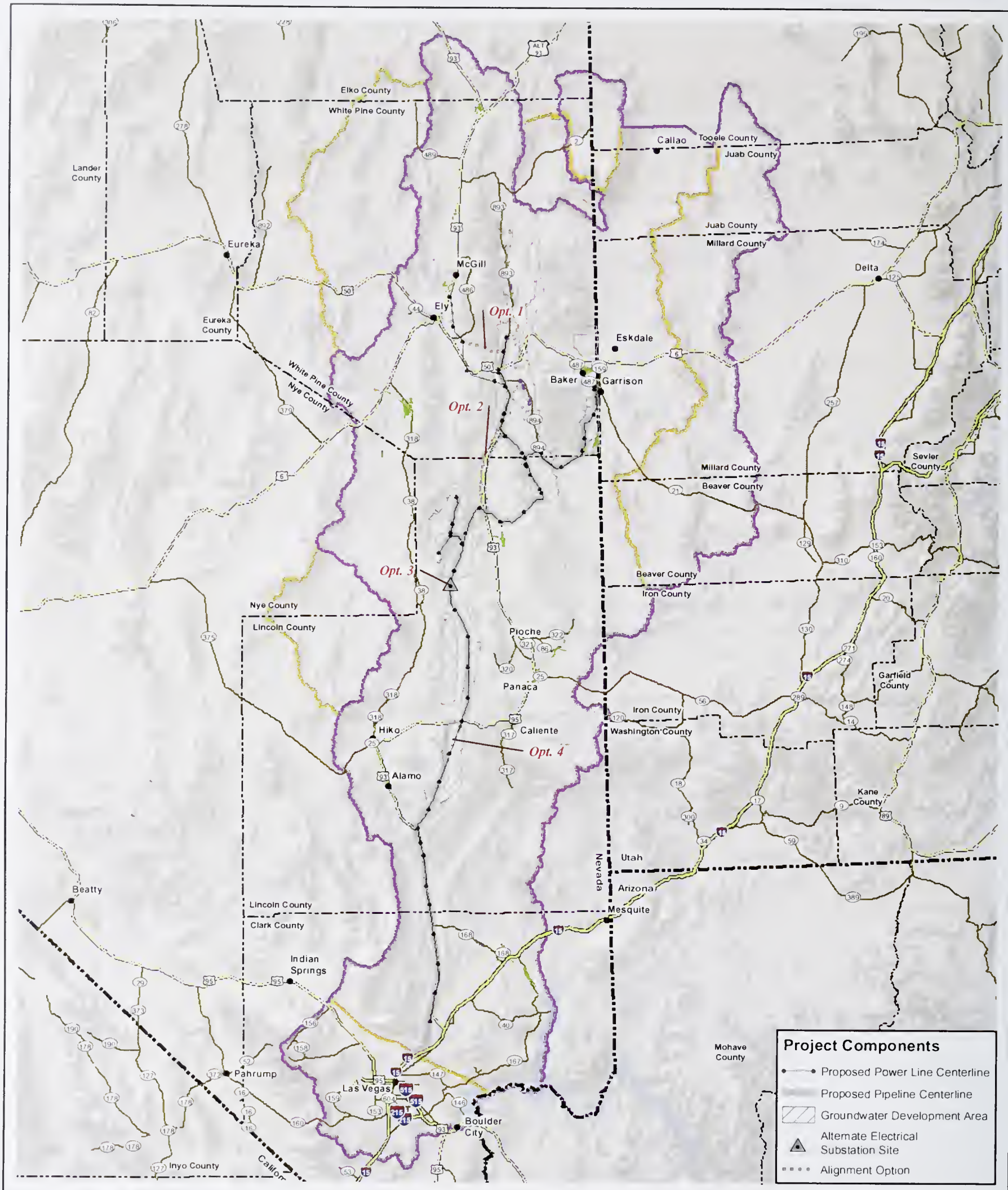
Land Ownership

Approximately 97 percent of the land within ROWs and ancillary areas is owned by the public and managed by the BLM. Private lands make up only 2 percent of the total area. Other lands crossed by the ROWs and ancillary facilities include State of Nevada lands and, under one alternative option (Alignment Option 1), public lands managed by the USFS. There are no other land owners directly affected by the ROWs and ancillary facilities.

Using available data, land disposals were identified according to the Ely RMP, a total of 75,758 acres of land available for potential disposal in the Ely Field Office (BLM 2008 [LR-20]). There are no lands available for potential disposal within the region of study for the ROWs and ancillary facilities.

Zoning

Zoning within the ROW and ancillary facilities is primarily rural residential and agricultural. The proposed pipeline, power line, and ancillary facilities also pass through or are sited in some areas that are zoned for open space, industrial, or public facility uses.



No Warranty is made by the Bureau of Land Management as to the accuracy reliability or completeness of these data for individual use or aggregate use with other data.

Residential Lands

The proposed ROW and ancillary facilities would be located in rural areas, almost entirely on BLM lands. An analysis of aerial-map data determined that there are no residences within a mile of the proposed ROW and ancillary facilities; the nearest farmstead is approximately 1.5 miles east of the Snake Lateral pipeline and power line, northwest of Baker. Baker, in eastern White Pine County, is the only community in which a segment of the proposed pipeline ROW and ancillary facilities would be located. Additional ROWs for collector lines and ancillary facilities could be added in the future that could be sited closer than 1 mile to the existing residences. Additional facilities would be addressed with subsequent NEPA analysis in the form of an EA or EIS.

Agricultural Lands

Only a small amount of private agricultural land is crossed by the proposed project ROW and ancillary facilities. Approximately 8.5 acres of private land, which is zoned for agricultural use but not currently used for this purpose, in the southwestern portion of the construction-support area near Caliente would be used for construction management offices in temporary portable trailers.

Utility Corridors

There are approximately 273,290 acres of utility corridors within the region of study, primarily extending along a north-south axis. The ROWs and ancillary facilities occur primarily within utility corridors as shown in **Figure 3.8-5**. These utility corridors are associated with pipelines, electric transmission lines, and roads, as well as a few other ROW types.

Right-of-way Avoidance and Exclusion Areas

The proposed project ROWs or ancillary facilities would cross two ROW avoidance areas—the Coyote Springs and Kane Springs ACECs. There are no ROW exclusion areas affected by the proposed project ROW or ancillary facilities.

3.8.1.4 Groundwater Development Areas

Land Ownership

As mentioned in Section 3.8.1.2, most land in the project vicinity is BLM-administered public land. There is no other government ownership within the groundwater development areas. A small portion of the land within the groundwater development areas is privately owned.

The Ely RMP identified a total of 75,758 acres of land available for potential disposal in the Ely Field Office (BLM 2008, LR-20), of which 4,924 acres occur within groundwater development areas (106 acres in Spring Valley and 4,817 acres in Snake Valley).

Zoning

Zoning within the groundwater development areas is primarily rural residential and agricultural.

Residential Lands

One residence was identified within a groundwater development area. Approximately 72 residences were identified within 1 mile of the groundwater development areas. Any facilities sited closer to residences than identified in this Final EIS would undergo additional NEPA.

Agricultural Lands

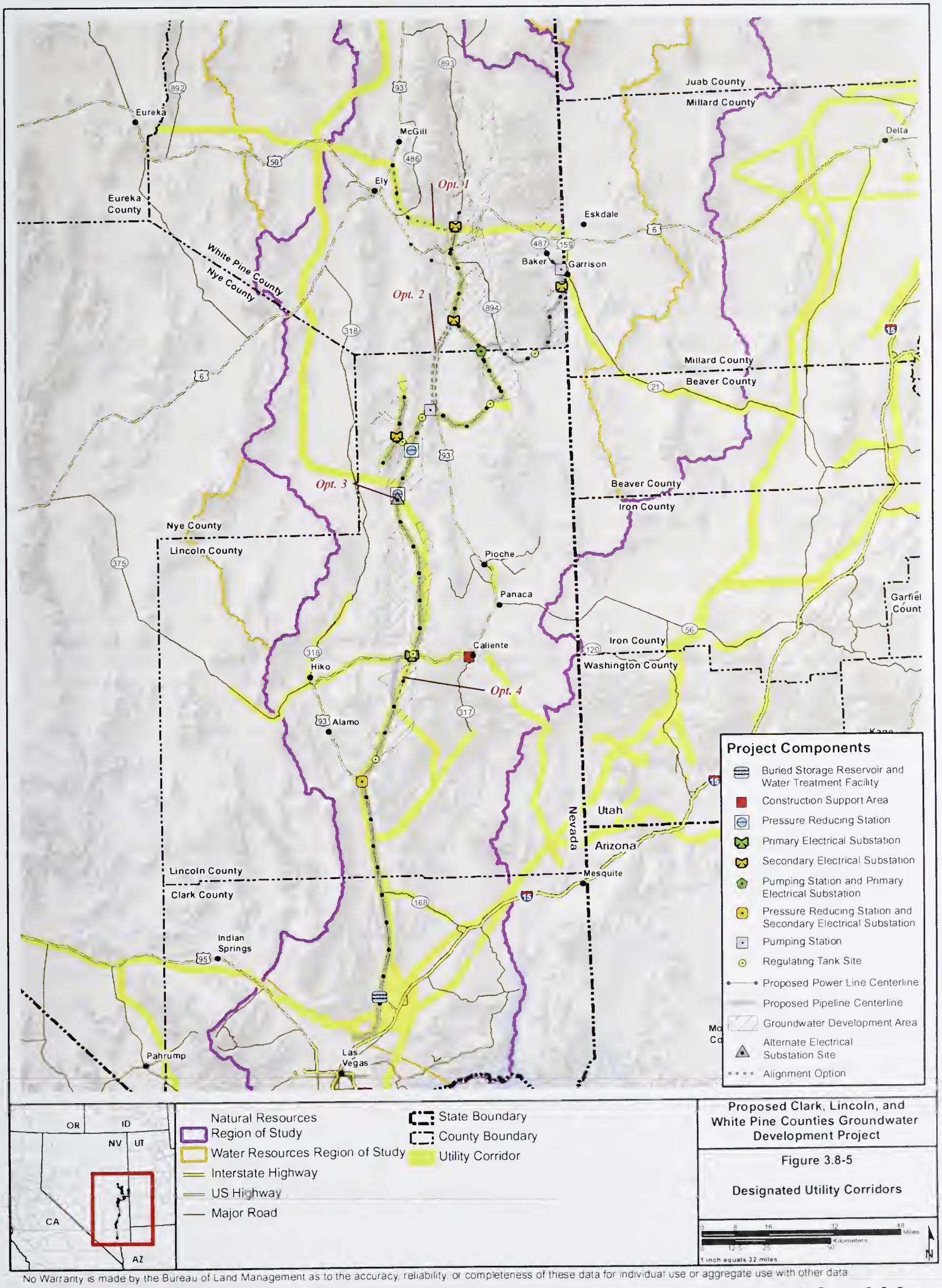
No agricultural lands are within the groundwater development areas in Lincoln County. A total of 27 agricultural acres are associated with the Proposed Action in Snake and Spring valleys (22 acres and 5 acres, respectively), of which only the 5 acres in Spring Valley are owned by SNWA.

Utility Corridors

Activities in the groundwater development areas, which would be subject to evaluation under subsequent NEPA, would occur primarily outside of the designated utility corridors shown in **Figure 3.8-5**.

Right-of-way Avoidance and Exclusion Areas

Three ROW avoidance areas—the Swamp Cedar, Baking Powder Flat, and Baker Archaeological Site ACECs—are located within the boundaries of proposed groundwater development areas. The groundwater development area boundaries were delineated to avoid ROW exclusion areas, including wilderness areas.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

3.8.2 Environmental Consequences

3.8.2.1 Rights-of-way

Issues

- Surface disturbance could be inconsistent with other local, state, and federal land-use plans.
- Land-ownership adjustments could be limited by the project land uses and aboveground facilities.
- The placement of ROWs or ancillary facilities could be incompatible with zoning.
- Residences within 1 mile of ROWs and ancillary facilities could be affected by pipeline and power line construction, operation, and maintenance.
- Agricultural lands could be altered by construction or converted to permanent facilities.
- Surface disturbance could occur outside of areas determined compatible for development, including utility corridors, and may encroach on ROW exclusion or avoidance areas.

Assumptions

- Identification of the effects on land uses focused on those areas that would be disturbed by construction of facilities or in which land-use changes would occur as a result of the proposed project.
- Department of Defense lands would not be used for the project.
- Facilities would not be approved in identified ROW exclusion areas. If facilities were approved in these areas, an RMP amendment would be required.

Methodology for Analysis

Any potential conflicts or conversion of existing land uses would be identified as an impact. Land-use constraints in the Ely and Las Vegas RMPs, as well as other land-use planning documents, were used to determine whether the proposed project would comply with existing land use and zoning. Any utilities that would be constructed outside of designated utility ROWs are identified where they occur. Any utilities proposed for ROW avoidance or exclusion areas, as identified through the BLM's RMPs, would be considered a change from existing plan requirements and would be identified as an impact.

3.8.2.2 Proposed Action, Alternatives A through C

Construction and Facility Maintenance

Land Ownership

As shown in **Table 3.8-1**, the direct effect of construction of the ROWs and ancillary facilities would occur mostly on lands that are managed by the BLM, followed by private lands, and State of Nevada land. Other federal lands are not directly affected under this alternative.

BLM 2012

Table 3.8-1 Lands Affected by Construction of the Rights-of-way and Ancillary Facility Areas for the Proposed Action and Alternatives A through C (Acres)

Basin	BLM	Other Federal Agencies	Private	State of Nevada
Cave Valley	712	0	0	0
Coyote Spring Valley	1,675	0	52	0
Delamar Valley	891	0	0	0
Dry Lake Valley	2,631	0	0	0
Garnet Valley	304	0	1	0
Hamlin Valley	384	0	0	0
Hidden Valley (North)	478	0	0	0
Lake Valley	804	0	0	0
Las Vegas Valley	130	0	35	57
Lower Meadow Valley Wash	0	0	121	0
Pahranagat Valley	252	0	0	0
Snake Valley (Nevada only)	879	0	0	0
Spring Valley	2,553	0	0	0
Steptoe Valley	307	0	3	17
Total	**12,000**	**0**	**212**	**74**

Note: Due to rounding, the totals may be different than the sum of individual acres.

As shown in **Table 3.8-2**, operation and maintenance of permanent ROWs and ancillary facilities would primarily affect lands that are managed by the BLM and private lands, with a nominal amount of State of Nevada land also being affected.

Table 3.8-2 Lands Affected by the Operation of the Rights-of-way and Ancillary Facility Areas for the Proposed Action and Alternatives A through C (Acres)

Basin	BLM	Other Federal Agencies	Private	State of Nevada
Cave Valley	21	0	0	0
Coyote Spring Valley	116	0	5	0
Delamar Valley	74	0	0	0
Dry Lake Valley	202	0	0	0
Garnet Valley	75	0	0	0
Hamlin Valley	2	0	0	0
Hidden Valley (North)	38	0	0	0
Lake Valley	57	0	0	0
Las Vegas Valley	9	0	2	6
Lower Meadow Valley Wash	0	0	121	0
Pahranagat Valley	4	0	0	0
Snake Valley (Nevada only)	52	0	0	0
Spring Valley	194	0	0	0
Steptoe Valley	20	0	0	0
Total	**864**	**0**	**128**	**6**

Note: Due to rounding, the totals may be different than the sum of individual acres.

BLM lands available for disposal (shown in **Figure 3.8-2**), which are primarily located around existing communities for open space, parks, and community-related development, would not be limited by construction, operation, and maintenance of ROWs and ancillary facilities.

Zoning

No areas in which the construction of ROWs and ancillary facilities would conflict with current zoning have been identified.

Residential Lands

No residences have been identified within 1 mile of the proposed ROWs and ancillary facilities.

Agricultural Lands

Approximately 8.5 acres of agricultural land would be affected by surface disturbance and facility construction in the construction-support area near Caliente. Although this land is not currently used for agriculture, the area would be temporarily converted to a construction support area consisting of construction management offices in temporary portable trailers.

Utility Corridors

The miles of pipeline and power line that occur outside of designated utility corridors are summarized in **Table 3.8-3**. Overall, approximately 75 percent of the pipelines and power lines would be located within designated utility corridors for the Proposed Action and Alternatives A through C. Approximately 25 percent of the ROWs would be constructed on land that is not managed for or designated as a utility corridor, the majority of which would be in Lincoln County and some areas in White Pine County. Siting utilities outside designated corridors is reviewed on a case-by-case basis and would require a ROW permit from the BLM-authorized officer.

Right-of-way Exclusion and Avoidance Areas

The proposed project ROWs or ancillary facilities would cross two ROW avoidance areas—the Coyote Springs and Kane Springs ACECs. Facilities in ROW avoidance areas are subject to BLM approval depending on whether the uses are consistent with the special designation associated with the area (analyzed in Section 3.14, Special Designations). If facilities are approved in ROW avoidance areas, the BLM may impose additional stipulations for operations and maintenance.

Conclusion

Short-term construction disturbance associated with ROWs and ancillary facilities would occur on land that is managed by the BLM (12,000 acres), private owners (212 acres), and the State of Nevada (74 acres). Long-term operation and maintenance of permanent ROWs and facilities would primarily affect lands that are managed by the BLM (864 acres) and private lands (128 acres), with 6 acres of State of Nevada land also being affected. BLM lands available for disposal, zoning, and residential areas would not be affected by construction, operation, and maintenance of ROWs and ancillary facilities. Temporary disturbance of 8.5 acres would occur on private land near Caliente that is zoned for agricultural use. Twenty-five percent of the proposed ROWs would be located outside of designated utility corridors, extending construction disturbance and facility maintenance beyond the utility corridors specified in RMPs for the area. Two ROW avoidance areas would be affected and additional stipulations may be imposed if facilities are approved in these areas.

Additional mitigation measures:

None. Mitigation to address potential conflicts in the ROW avoidance areas is discussed under Special Designations in Section 3.14.

Residual impacts include:

Long-term, permanent disturbance from pipelines, power lines, and associated facilities would occur on land that is managed by the BLM (864 acres), private owners (128 acres), and the State of Nevada (6 acres).

Table 3.8-3 Miles of Pipeline and Power Line Outside of Designated Utility Corridors, Proposed Action and Alternatives A through C

Project Component	Basin	Miles Outside of Utility Corridor	Total Miles	Percentage Outside of Utility Corridor
Pipeline Centerline	Cave Valley	0	19	0
	Coyote Spring Valley	11	40	27
	Delamar Valley	9	23	39
	Dry Lake Valley	2	70	3
	Garnet Valley	1	7	14
	Hamlin Valley	10	10	100
	Hidden Valley (north)	0	12	0
	Lake Valley	0	21	0
	Las Vegas Valley	2	9	22
	Pahranagat Valley	<1	7	4
	Snake Valley	23	23	100
	Spring Valley	17	64	26
Total For Pipeline		**75**	**305**	**25**
Power Line Centerline	Cave Valley	0	19	0
	Coyote Spring Valley	12	41	31
	Delamar Valley	0	23	0
	Dry Lake Valley	0	68	0
	Garnet Valley	0	2	0
	Hamlin Valley	10	10	100
	Hidden Valley (north)	0	12	0
	Lake Valley	0	21	0
	Pahranagat Valley	0	6	0
	Snake Valley	23	23	100
	Spring Valley	23	71	33
	Steptoe Valley	13	27	49
Total For Power Line		**81**	**323**	**25**

3.8.2.3 Alternative D

Construction and Facility Maintenance

Land Ownership

As shown in **Table 3.8-4**, the direct effect of construction of the ROWs and ancillary facilities would occur mostly on lands that are managed by the BLM, followed by private lands, and State of Nevada land. Other federal lands are not directly affected under this alternative.

Table 3.8-4 Lands Affected by Construction of the Rights-of-way and Ancillary Facility Areas for Alternative D (Acres)

Basin	BLM	Other Federal Agencies	Private	State of Nevada
Cave Valley	712	0	0	0
Coyote Spring Valley	1,675	0	52	0
Delamar Valley	891	0	0	0
Dry Lake Valley	2,631	0	0	0
Garnet Valley	304	0	1	0
Hamlin Valley	0	0	0	0
Hidden Valley (North)	478	0	0	0
Lake Valley	804	0	0	0
Las Vegas Valley	130	0	35	57
Lower Meadow Valley Wash	0	0	121	0
Pahranagat Valley	252	0	0	0
Snake Valley (Nevada only)	0	0	0	0
Spring Valley	683	0	0	0
Steptoe Valley	0	0	0	0
Total	**8,560**	**0**	**208**	**57**

Note: Due to rounding, the totals may be different than the sum of individual acres.

As shown in **Table 3.8-5**, operation and maintenance of permanent ROWs and ancillary facilities would primarily affect lands that are managed by the BLM and private lands, with a nominal amount of State of Nevada land also being affected.

Table 3.8-5 Lands Affected by the Operation of the Rights-of-way and Ancillary Facility Areas for Alternative D (Acres)

Basin	BLM	Other Federal Agencies	Private	State of Nevada
Cave Valley	21	0	0	0
Coyote Spring Valley	116	0	5	0
Delamar Valley	74	0	0	0
Dry Lake Valley	202	0	0	0
Garnet Valley	75	0	0	0
Hamlin Valley	0	0	0	0
Hidden Valley (North)	38	0	0	0
Lake Valley	57	0	0	0
Las Vegas Valley	9	0	2	6
Lower Meadow Valley Wash	0	0	121	0
Pahranagat Valley	4	0	0	0
Snake Valley (Nevada only)	0	0	0	0
Spring Valley	76	0	0	0
Steptoe Valley	0	0	0	0
Total	**672**	**0**	**128**	**6**

Note: Due to rounding, the totals may be different than the sum of individual acres.

The BLM lands available for disposal (shown in **Figure 3.8-2**), which are primarily located around existing communities for open space, parks, and community-related development, would not be limited by construction, operation, and maintenance of the ROWs and ancillary facilities.

Zoning

No areas in which the construction of ROWs and ancillary facilities would conflict with current zoning have been identified.

Residential Lands

No residences have been identified within 1 mile of the proposed ROWs and ancillary facilities.

Agricultural Lands

Approximately 8.5 acres of private land zoned for agriculture would be affected by surface disturbance and facility construction in the construction-support area near Caliente. This land would be temporarily converted to a construction support area consisting of construction management offices in temporary portable trailers.

Utility Corridors

The miles of pipeline and power line that occur outside of designated utility corridors are summarized in **Table 3.8-6**. Overall, approximately 90 percent of the pipelines and power lines would be located within designated utility corridors for Alternative D. Approximately 10 percent of the ROWs, primarily in Lincoln County, would be constructed on land that is not managed for or designated as a utility corridor. Siting utilities outside designated corridors is reviewed on a case-by-case basis and would require a ROW permit from the BLM-authorized officer.

Right-of-way Exclusion and Avoidance Areas

The proposed project ROWs or ancillary facilities would cross two ROW avoidance areas—the Coyote Springs and Kane Springs ACECs. Facilities in ROW avoidance areas are subject to BLM approval depending on whether the uses are consistent with the special designation associated with the area (analyzed in Section 3.14, Special Designations). If facilities are approved in ROW avoidance areas, the BLM may impose additional stipulations for operations and maintenance.

Conclusion

Short-term construction disturbance associated with ROWs and ancillary facilities would occur on land managed by the BLM (8,560 acres), private owners (208 acres), and the State of Nevada (57 acres). Long-term operation and maintenance of permanent ROWs and facilities would primarily affect lands that are managed by the BLM (672 acres) and private lands (128 acres), with 6 acres of State of Nevada land also being affected. Temporary disturbance of 8.5 acres would occur on private agricultural land near Caliente. Ten percent of the proposed ROWs would be located outside of designated utility corridors, extending construction disturbance and facility maintenance beyond the corridors specified in RMPs for the area. Two ROW avoidance areas would be affected and additional stipulations may be imposed if facilities are approved in these areas.

Additional mitigation measures:

None. Mitigation to address potential conflicts in the ROW avoidance areas is discussed under Special Designations in Section 3.14.

Residual impacts include:

Long-term, permanent disturbance from pipelines, power lines, and associated facilities would occur on land that is managed by the BLM (687 acres), private owners (128 acres), and the State of Nevada (6 acres).

Table 3.8-6 Miles of Pipeline and Power Line Occurring Outside of Designated Utility Corridors, Alternative D

Project Component	Basin	Miles Outside of Utility Corridor	Total Miles	Percentage Outside of Utility Corridor
Pipeline Centerline	Cave Valley	0	19	0
	Coyote Spring Valley	11	40	27
	Delamar Valley	9	23	39
	Dry Lake Valley	2	70	3
	Garnet Valley	1	7	14
	Hamlin Valley	0	0	0
	Hidden Valley (north)	0	12	0
	Lake Valley	0	21	0
	Las Vegas Valley	2	9	22
	Pahranagat Valley	<1	7	4
	Snake Valley	0	0	0
	Spring Valley	3	17	18
Total For Pipeline		**28**	**225**	**12**
Power-Line Centerline	Cave Valley	0	19	0
	Coyote Spring Valley	12	41	30
	Delamar Valley	0	23	0
	Dry Lake Valley	0	68	0
	Garnet Valley	0	2	0
	Hamlin Valley	0	0	0
	Hidden Valley (north)	0	12	0
	Lake Valley	0	21	0
	Pahranagat Valley	0	6	0
	Snake Valley	0	0	0
	Spring Valley	4	17	6
	Steptoe Valley	0	0	0
Total for Power Line		**16**	**209**	**8**

3.8.2.4 Alternatives E and F

Construction and Facility Maintenance

Land Ownership

As shown in **Table 3.8-7**, the direct effect of construction of the ROWs and ancillary facilities would occur mostly on lands managed by the BLM, followed by private lands, and State of Nevada land. Other federal lands are not directly affected under this alternative.

Table 3.8-7 Lands Affected by Construction of the Rights-of-way and Ancillary Facility Areas for Alternatives E and F (Acres)

Basin	BLM	Other Federal Agencies	Private	State of Nevada
Cave Valley	712	0	0	0
Coyote Spring Valley	1,675	0	52	0
Delamar Valley	891	0	0	0
Dry Lake Valley	2,631	0	0	0
Garnet Valley	304	0	1	0
Hamlin Valley	0	0	0	0
Hidden Valley (North)	478	0	0	0
Lake Valley	804	0	0	0
Las Vegas Valley	130	0	35	74
Lower Meadow Valley Wash	0	0	121	0
Pahranagat Valley	252	0	0	0
Snake Valley (Nevada only)	0	0	0	0
Spring Valley	2,209	0	0	0
Steptoe Valley	307	0	3	0
Total	**10,393**	**0**	**212**	**74**

Note: Due to rounding, the totals may be different than the sum of individual acres.

Operation and maintenance of permanent ROWs and facilities would primarily affect lands that are managed by the BLM (810 acres) and private lands (128 acres), with 6 acres of State of Nevada land also being affected (**Table 3.8-8**).

Table 3.8-8 Lands Permanently Affected by the Operation of the Rights-of-way and Ancillary Facility Areas for Alternatives E and F (Acres)

Basin	BLM	Other Federal Agencies	Private	State of Nevada
Cave Valley	21	0	0	0
Coyote Spring Valley	116	0	5	0
Delamar Valley	74	0	0	0
Dry Lake Valley	202	0	0	0
Garnet Valley	75	0	0	0
Hamlin Valley	0	0	0	0
Hidden Valley (North)	38	0	0	0
Lake Valley	57	0	0	0
Las Vegas Valley	9	0	2	6
Lower Meadow Valley Wash	0	0	121	0
Pahranagat Valley	4	0	0	0
Snake Valley (Nevada only)	0	0	0	0
Spring Valley	194	0	0	0
Steptoe Valley	20	0	0	0
Total	**810**	**0**	**128**	**6**

Note: Due to rounding, the totals may be different than the sum of individual acres.

The BLM lands available for disposal (shown in **Figure 3.8-2**), which are primarily located around existing communities for open space, parks, and community-related development, would not be limited by construction, operation, and maintenance of the ROWs and ancillary facilities.

Zoning

No areas in which the construction of ROWs and ancillary facilities would conflict with current zoning have been identified.

Residential Lands

No residences have been identified within 1 mile of the proposed ROWs and ancillary facilities.

Agricultural Lands

Approximately 8.5 acres of private land zoned for agriculture would be affected by surface disturbance and facility construction in the construction-support area near Caliente. This land would be temporarily converted to a construction support area consisting of construction management offices in temporary portable trailers.

Utility Corridors

The miles of pipeline and power line that occur outside of designated utility corridors are summarized in **Table 3.8-9**. Overall, approximately 85 percent of the pipelines and power lines would be located within designated utility corridors for Alternatives E and F. Approximately 15 percent of the ROWs, primarily in Lincoln County with some area in White Pine County, would be constructed on land that is not managed for or designated as a utility corridor. Siting utilities outside designated corridors is reviewed on a case-by-case basis and would require a ROW permit from the BLM-authorized officer.

Right-of-way Exclusion and Avoidance Areas

The proposed project ROWs or ancillary facilities would cross two ROW avoidance areas—the Coyote Springs and Kane Springs ACECs. Facilities in ROW avoidance areas are subject to BLM approval depending on whether the uses are consistent with the special designation associated with the area (analyzed in Section 3.14, Special Designations). If facilities are approved in ROW avoidance areas, the BLM may impose additional stipulations for operations and maintenance.

Conclusion

Short-term construction disturbance associated with ROWs and ancillary facilities would occur on land that is managed by the BLM (10,408 acres), private owners (212 acres), and the State of Nevada (74 acres). Long-term operation and maintenance of permanent ROWs and facilities would primarily affect lands that are managed by the BLM (825 acres) and private lands (128 acres), with 6 acres of State of Nevada land also being affected. Temporary disturbance of 8.5 acres would occur on private land near Caliente that is zoned for agriculture. Fifteen percent of the ROW corridors would be outside of designated utility corridors, extending construction disturbance and facility maintenance beyond the corridors specified in RMPs for the area. Two ROW avoidance areas would be affected and additional stipulations may be imposed if facilities are approved in these areas.

Additional mitigation measures:

None. Mitigation to address potential conflicts in the ROW avoidance areas is discussed under Special Designations in Section 3.14.

Residual impacts include:

Long-term, permanent disturbance from pipelines, power lines, and associated facilities would occur on land that is managed by the BLM (825 acres), private owners (128 acres), and the State of Nevada (6 acres).

Table 3.8-9 Miles of Pipeline and Power Line Outside of Designated Utility Corridors, Alternatives E and F

Project Component	Basin	Miles Outside of Utility Corridor	Total Miles	Percentage Outside of Utility Corridor
Pipeline Centerline	Cave Valley	0	19	0
	Coyote Spring Valley	11	40	27
	Delamar Valley	9	23	39
	Dry Lake Valley	2	70	3
	Garnet Valley	1	7	14
	Hamlin Valley	0	0	0
	Hidden Valley (north)	0	12	0
	Lake Valley	0	21	0
	Las Vegas Valley	2	9	22
	Pahranagat Valley	<1	7	4
	Snake Valley	0	0	0
	Spring Valley	8	55	26
Total For Pipeline		**33**	**263**	**13**
Power Line Centerline	Cave Valley	0	19	0
	Coyote Spring Valley	12	41	30
	Delamar Valley	0	23	0
	Dry Lake Valley	0	68	0
	Garnet Valley	0	2	0
	Hamlin Valley	0	0	0
	Hidden Valley (north)	0	12	0
	Lake Valley	0	21	0
	Pahranagat Valley	0	6	0
	Snake Valley	0	0	0
	Spring Valley	14	62	22
	Steptoe Valley	13	27	48
Total for Power Line		**39**	**281**	**14**

3.8.2.5 Alignment Options 1 through 4

Impacts for the Alignment Options (1 through 4) are identified in relation to the relevant segment of the Proposed Action and Alternatives A through C (**Table 3.8-10**). **Table 3.8-10** identifies differences in effects to landownership and miles of power line and pipeline centerline outside of designated utility corridors, as compared to the Proposed Action and Alternatives A through C. There are no differences between the alignment options and the Proposed Action with regard to impacts to lands available for disposal, zoning, residential lands, agricultural lands, and ROW avoidance or exclusion areas.

Table 3.8-10 Land Use Impact Summary for Alignment Options

Alignment Option	Analysis
Alignment Option 1 (Humboldt-Toiybe Powcr Line Alignment) **Option Description**: Change the loeations of a portion of the 230-kV power line from Gonder Substation near Ely to Spring Valley. **Applicable To**: Proposed Aetion and Alternatives A through C, E, and F.	Alignment Option 1 is thc only alternative that would eross USFS land in Spring and Steptoe vallcys. There would be 104 aeres of temporary eonstruetion disturbanec within a dcsignated utility eorridor on USFS land. Other effects to landownership compared to the Proposcd Action inelude 2 perecnt less BLM land (58 acres less in Spring Valley and 145 aeres lcss in Steptoe Valley) and 2 percent morc private land (4 acres in Spring Valley). Permanent facilities would be loeated on 12 aeres of USFS lands and affect 3 pereent less BLM land (5 aeres less in Spring Valley and 18 aeres less in Steptoe Valley) and <1 pereent more private land (1 aere in Spring Valley). Under Alignment Option 1, there would be 138 miles of ROWs outside of designated utility eorridors (a 12 pereent reduetion compared to the Proposed Aetion).
Alignment Option 2 (North Lake Valley Pipelinc Alignmcnt) **Option Description**: Change the locations of portions of thc mainline pipeline and eleetrieal transmission linc in North Lake Valley. **Applicable To**: Proposed Aetion and Alternatives A through C, E, and F.	Alignment Option 2 would affeet <1 percent less BLM land (246 aeres more in Lake Valley and 248 aeres less in Spring Valley) and 25 pereent more private land (54 acres in Lake Valley). Permancnt facilities would affeet 1 pereent more BLM land (89 aeres more in Lake Valley and 79 aeres less in Spring Valley) and 4 percent morc private land (5 aeres in Lakc Valley). Under Alignment Option 2, there would be 197 miles of ROWs outside of designated utility eorridors (a 25 pereent increase compared to the Proposed Aetion).
Alignment Option 3 (Mulcshoe Substation and Powcr Line Alignment) **Option Description**: Eliminate the Gonder to Spring Valley transmission line, and construct a substation with an intereonneetion with an interstate, high voltage power linc in Muleshole Valley. **Applicable To**: Proposed Aetion and Alternatives A through C, E, and F.	Alignment Option 3 would affect 3 pereent less BLM land (44 aeres less in Dry Lake Valley, 82 acres less in Spring Valley, and eliminate disturbance of 307 acres in Steptoe Valley), 33 pereent less state land (eliminate disturbance of 17 aeres in Steptoe Valley), and 1 percent less privatc land (eliminate disturbance of 3 acres in Steptoe Valley). Permanent facilities would affeet 2 perecnt more BLM land (42 aercs more in Dry Lake Valley, 9 aeres less in Spring Valley, and eliminate use of 20 acres in Steptoe Vallcy). Under Alignment Option 3, there would be 138 miles of ROWs outside of designatcd utility corridors (a 12 percent inerease eompared to the Proposed Action).
Alignment Option 4 (North Delamar Valley Pipeline and Power Linc Alignment) **Option Description**: Change the loeation of a short section of mainlinc pipeline in Delamar Valley to follow an existing transmission linc. **Applicable To**: All alternatives.	Alignment Option 4 would affeet <1 pereent less BLM land (13 acres less in Delamar Valley and 38 aeres less in Dry Lake Valley). Permanent faeilities would affeet 5 pereent less BLM land (31 acres less in Delamar Valley and 14 aeres less in Dry Lake Valley). Under Alignment Option 4, there would be 147 milcs of ROWs outside of designated utility corridors (7 pereent reduetion eompared to the Proposed Aetion).

3.8.2.6 No Action Alternative

Under the No Action Alternative, project construction and operation would be limited to that which is already approved. The majority of the surface-disturbing activities to construct pipelines would occur on public lands in Lincoln and Clark counties. The use of lands that are managed by other federal and state agencies would be handled in compliance with specific, existing management plans and guidelines. No changes to land use would occur.

3.8.2.7 Comparison of Alternatives

Table 3.8-11 provides a comparison of impacts for construction and facility maintenance of the action alternatives on land use resources.

Table 3.8-11 Comparison of Alternatives – Rights-of-way

Parameter	Proposed Action and Alternatives A through C	Alternative D	Alternatives E and F
Land Ownership	Residual impacts to 999 acres (BLM – 864, Private – 128, and State of Nevada – 6).	Residual impacts to 808 acres (BLM – 672, Private – 128, and State of Nevada – 6).	Residual impacts to 945 acres (BLM – 810, Private – 128, and State of Nevada – 6).
Zoning	No conflicts between ROWs and existing zoning were identified.	No conflicts between ROWs and existing zoning were identified.	No conflicts between ROWs and existing zoning were identified.
Residential Lands	No residences have been identified within 1 mile of the proposed ROWs and ancillary facilities.	No residences have been identified within 1 mile of the proposed ROWs and ancillary facilities.	No residences have been identified within 1 mile of the proposed ROWs and ancillary facilities.
Agricultural Lands	8.5 acres zoned for agricultural would be affected by the construction support area.	8.5 acres zoned for agricultural would be affected by the construction support area.	8.5 acres zoned for agricultural would be affected by the construction support area.
Utility Corridors	Approximately 75 miles of pipeline and 81 miles of power line would occur outside designated utility corridors.	Approximately 28 miles of pipeline and 16 miles of power line would occur outside designated utility corridors.	Approximately 33 miles of pipeline and 39 miles of power line would occur outside designated utility corridors.
ROW Exclusion and Avoidance Areas	Crosses 2 ROW avoidance areas; avoids ROW exclusion areas.	Crosses 2 ROW avoidance areas; avoids ROW exclusion areas.	Crosses 2 ROW avoidance areas; avoids ROW exclusion areas.

3.8.2.8 Groundwater Development and Groundwater Pumping

Issues

Construction and Facility Maintenance

- Surface disturbance could be inconsistent with other local, state, and federal land use plans.
- Land ownership adjustments could be limited by the project land uses and aboveground facilities. The groundwater development areas could be incompatible with zoning.
- Residences within 1 mile of groundwater development areas could be affected by well, collector pipeline, and distribution power line construction, operation, and maintenance.
- Agricultural lands could be altered by construction or converted to permanent facilities.

Groundwater Pumping

- Groundwater pumping could affect future land ownership uses.
- Groundwater pumping could affect the water available for agricultural irrigation.

Assumptions

Construction and Facility Maintenance

- Identification of the effects on land uses focused on those areas that would be disturbed by construction of facilities or in which land use changes would occur as a result of the proposed project.
- No agricultural lands would be disturbed by construction or converted to permanent facilities.
- Department of Defense lands would not be used for the project.
- Facilities would not be approved in identified ROW exclusion areas. If facilities were approved in these areas, an RMP amendment would be required.

Groundwater Pumping

- Because the exact locations of the wells and associated facilities that would be needed for pumping are unknown at this stage of the project, impact discussions are qualitative and general for effects in Spring, Snake, Delamar, Dry Lake, and Cave valleys.
- Agricultural lands are assumed to be the land use category that would be affected by groundwater drawdown.
- Assumptions about the potential changes in future groundwater availability from groundwater pumping do not incorporate additional assumptions about the effects of climate change because specific long term effects of climate change are not presently known, and the incremental contribution of climate change effects to project effects cannot be reasonably estimated. A general discussion of climate change effects is provided in Section 3.8.3.1, Impacts Common to All Alternatives.

Methodology for Analysis

Any potential conflicts or conversion of existing land uses would be identified as an impact. Land use constraints in the Ely and Las Vegas RMPs, as well as other land use planning documents, were used to determine whether the proposed project would comply with existing land use and zoning. Any utilities proposed for ROW avoidance or exclusion areas, as identified through BLM's RMPs, would be considered a change from existing plan requirements and would be identified as an impact. Any utilities constructed outside of designated utility ROWs would be identified where they occur.

Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

3.8.2.9 Proposed Action

Groundwater Development Area

Land Ownership

The groundwater development areas primarily would encompass lands administered by the BLM (728,977 acres) as well as some private lands (941 acres) as shown in **Table 3.8-12**. No other land owners would be affected by the future development. Future construction includes production wells, collector pipelines, power lines, substations, and pump stations distributed throughout the five groundwater basins and would permanently convert these land uses from previously undeveloped areas.

Table 3.8-12 Land Ownership within the Groundwater Development Areas for the Proposed Action and Alternatives A through C (Acres)

	Basin	BLM	Other Federal Agencies	Private	
				SNWA	Other Private
Proposed Action	Cave Valley	34,787	0	0	0
	Delamar Valley	71,889	0	0	0
	Dry Lake Valley	168,769	0	0	0
	Snake Valley	92,033	0	0	645
	Spring Valley	361,499	0	261	35
	Total	**728,977**	**0**	**261**	**680**

BLM lands available for disposal (**Figure 3.8-2**) primarily are located around existing communities for open space, parks, and community-related development. There are 4,817 acres identified by the BLM for land disposals in Snake Valley near the community of Baker and 106 acres in Spring Valley within the groundwater development areas. Depending on the intended use and placement of facilities in relation to these parcels, lands available for disposal could be affected. These effects are further discussed in Section 3.18, Socioeconomics and Environmental Justice.

Zoning

No areas in which the construction of the groundwater development areas would conflict with current zoning have been identified.

Residential Lands

Approximately 72 residences were identified within 1 mile of the groundwater development areas. Although these residences would not be directly affected by the construction on adjacent lands, they could be indirectly affected by well, collector pipeline, and distribution power line construction, operation, and maintenance. These effects are further discussed in Section 3.18, Socioeconomics and Environmental Justice.

Agricultural Lands

A total of 27 agricultural acres are encompassed by the groundwater development areas in Snake and Spring valleys (22 acres and 5 acres, respectively), of which only the 5 acres in Spring Valley are owned by SNWA. However, it is assumed that no agricultural lands would be disturbed by construction or converted to permanent facilities.

Utility Corridors

The majority of the groundwater development areas fall outside designated utility corridors. Siting utilities outside designated corridors is reviewed on a case-by-case basis and would require a ROW permit from the BLM-authorized official.

Right-of-way Exclusion and Avoidance Areas

Approval of groundwater development construction in three ROW avoidance areas—the Swamp Cedar, Baking Powder Flat, and Baker Archaeological Site ACECs—is subject to BLM approval depending on whether the uses are

consistent with the special designation associated with the area (analyzed in Section 3.14, Special Designations). If facilities are determined to be inconsistent with the area designation, possible mitigation or relocation to outside of these areas may be required.

Conclusion. Future construction includes production wells, collector pipelines, power lines, substations, and pump stations distributed throughout the 5 groundwater basins (estimated to total 3,590 to 8,410 acres) and would permanently convert these land uses from previously undeveloped areas. The groundwater development areas would primarily encompass lands administered by the BLM (728,977 acres) as well as some private lands (941 acres). There are 4,817 acres identified by the BLM for land disposals in Snake Valley near the community of Baker and 106 acres in Spring Valley within the groundwater development areas. Approximately 72 residences were identified within 1 mile of the groundwater development areas. Effects of the groundwater development areas on land disposals and residences are further discussed in Section 3.18, Socioeconomics and Environmental Justice. Although 27 acres of agricultural lands are encompassed by the groundwater development areas in Snake and Spring valleys (22 acres and 5 acres, respectively), it is assumed that no agricultural lands would be disturbed by construction or converted to permanent facilities. Construction of ROWs outside of approved utility corridors would extend disturbance outside the corridors specified in RMPs for the area. Three ROW avoidance areas would be affected subject to BLM approval.

Proposed mitigation measures:

Potential mitigation measures for impacts to residences and lands available for disposal are discussed in Section 3.18, Socioeconomics and Environmental Justice.

Potential residual impacts include:

- The residual impacts from the construction, operation, and maintenance of the groundwater development areas would be the permanent conversion of land from undeveloped to developed uses.

Groundwater Pumping

Impacts to Public Lands Available for Disposal

Groundwater pumping would result in the drawdown of groundwater levels. Public lands that are available for disposal might be less desirable for other land uses if they were within the 10-foot drawdown areas, as water and vegetation resources in some areas could be altered over time as discussed in Sections 3.3. Water Resources and 3.5, Vegetation Resources. While these disposal areas may be less desirable for parks, open space, or agriculture, other community uses such as active recreation or industrial uses would still be compatible in these areas if acquisition of these lands is pursued. Therefore, while these lands may be less desirable for some uses, the potential future disposal of these lands would not be precluded. Under the Proposed Action, approximately 4,926 acres of public land that are available for disposal would be affected by the drawdown of groundwater levels at full build out plus 75 years, and 5,399 acres would be affected at full build out plus 200 years. **Table 3.8-13** summarizes drawdown impacts to public lands available for disposal.

Table 3.8-13 Potential Impacts to Lands Available for Disposal for Proposed Action Drawdown (Acres)

Basin	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Panaca Valley	0	0	473
Snake Valley	0	4,819	4,819
Spring Valley	0	107	107
Total	**0**	**4,926**	**5,399**

Impacts to Private Agricultural Lands

The character of private agricultural lands in the 10-foot drawdown areas could be changed by the lower groundwater levels. **Table 3.8-14** summarizes acres of private agricultural lands that could be affected by the drawdown. Effects to private agricultural lands are further discussed in Section 3.18, Socioeconomics and Environmental Justice.

Table 3.8-14 Potential Impacts to Private Agricultural Lands for Proposed Action Drawdown (Acres)

Basin	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Lower Meadow Valley Wash	0	0	11
Snake Valley	0	11,086	12,012
Spring Valley	1,206	4,706	5,180
Total	**1,206**	**15,792**	**17,203**

Conclusion. Approximately 4,926 acres of public land available for disposal would be affected by the drawdown of groundwater levels at full build out plus 75 years, and 5,399 acres would be affected at full build out plus 200 years. Approximately 1,206 acres of private agricultural land would be affected by the drawdown of groundwater levels at full build out, 15,792 acres at full build out plus 75 years, and 17,203 acres at full build out plus 200 years. This may reduce the value of lands for disposal and agricultural uses, which is discussed further in Section 3.18, Socioeconomics and Environmental Justice.

Proposed mitigation measures:

None.

Potential residual impacts include:

- The COM Plan could be effective in reducing impacts to public lands available for disposal (4,926 acres). One relevant objective of the COM Plan to public lands available for disposal is to identify triggers for early warning of potential adverse impacts that would act as indicators for groundwater drawdown thresholds. Drawdown of groundwater levels would affect public lands available for disposal, which could reduce the value of lands for disposal. It is not possible to determine the level of impact reduction at this time. Residual effects on public lands available for disposal could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to public lands available for disposal could occur at some locations.

3.8.2.10 Alternatives A through F

Groundwater Development Area

The impacts to land use that could result from construction and facility maintenance of groundwater development areas for Alternatives A through F are summarized in **Table 3.8-15**.

Table 3.8-15 Summary of Land Use Impacts, Proposed Mitigation, and Residual Effects for Alternatives A through F

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Construction and Facility Maintenance					
Same as the Proposed Action.	Less total acreage, as compared to the Proposed Action, would be affected by surface disturbance under Alternative B. Less BLM-administered land (63,174 acres) and more private lands (1,790 acres) would be affected.	Same as the Proposed Action.	Alternative D would disturb less area and different corridors than the Proposed Action. In addition, impacts to land in Snake Valley and the White County portion of Spring Valley would be eliminated. Less BLM-administered land (335,193 acres) and no private lands would be affected.	Similar to the Proposed Action, except impacts to land in Snake Valley would be eliminated. Less BLM-administered land (636,944 acres) and less private lands (296 acres) would be affected.	Similar to the Proposed Action, except impacts to land in Snake Valley would be eliminated. Less BLM-administered land (636,944 acres) and less private lands (296 acres) would be affected.
Operation and Maintenance					
Same as the Proposed Action.	While the affected area would be reduced under Alternative B, the effects of operation and maintenance activities on land use would be the same as described for Alternative A.	Same as the Proposed Action.	While the affected area would be reduced under Alternative D, the effects of operation and maintenance activities on land use would be the same as described for Alternative A.	Same as the Proposed Action, except impacts to land use in Snake Valley would be eliminated.	Same as the Proposed Action, except impacts to land use in Snake Valley would be eliminated.
Additional Mitigation					
Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
Conclusion					
This alternative would have similar impacts compared to the Proposed Action.	This alternative would have fewer impacts compared to the Proposed Action. Less BLM-administered land and more private lands would be affected due to concentrated development.	This alternative would have similar impacts compared to the Proposed Action.	This alternative would have fewer impacts compared to the Proposed Action. Impacts to land use in Snake Valley and the White County portion of Spring Valley would be eliminated.	This alternative would have fewer impacts compared to the Proposed Action. Impacts to land use in Snake Valley would be eliminated.	This alternative would have fewer impacts compared to the Proposed Action. Impacts to land use in Snake Valley would be eliminated.
Potential Residual Impacts					
Same as the Proposed Action.	Less than the Proposed Action.	Same as the Proposed Action.	Less than the Proposed Action.	Less than the Proposed Action.	Less than the Proposed Action.

Groundwater Pumping

Thc impacts of groundwater pumping on land use for Alternatives A through F are summarized in **Table 3.8-16**.

Table 3.8-16 Summary of Impacts of Pumping on Land Use for Alternatives A through F

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Potential Impacts of Pumping					
Impacts to lands available for disposal would be the same as the Proposed Action. Fewer acres of private agricultural land would be affected: 332 acres at full build out, 14,605 acres at full build out plus 75 years, and 15,021 acres at full build out plus 200 years.	Acreage of lands available for disposal under full build out and full build out plus 75 years would be the same as the Proposed Action. Acreage would increase at full build out plus 200 years to 7,255 acres. More acres of private agricultural land would be affected at full build out (1,300 acres), fewer acres at full build out plus 75 years (13,865 acres), and more acres (17,522 acres) at full build out plus 200 years.	Impaets to lands available for disposal would be the same as the Proposed Action. Fewer acres of private agricultural land would be affected: 332 acres at full build out, 12,359 acres at full build out plus 75 years, and 13,749 acres at full build out plus 200 years.	Impacts to lands available for disposal would be less than the Proposed Action. Pumping effects would only occur to 915 acres after full build out. Fewer acres of private agricultural land would be affected: no acres at full build out, 299 acres at full build out plus 75 years, and 7,320 acres at full build out plus 200 years.	Impacts to lands available for disposal would be less than the Proposed Action. Pumping effects would only occur to 107 acres at full build out plus 75 years and full build out plus 200 years. Fewer acres of private agricultural land would be affected: 332 acres at full build out, 3,635 acres at full build out plus 75 years, and 3,791 acres at full build out plus 200 years.	Impacts to lands available for disposal would be less than the Proposed Action. Pumping effects would only occur to 107 aeres at full build out plus 75 years and full build out plus 200 years. Fewer aeres of privatc agricultural land would be affected: 554 acres at full build out, 4,400 acres at full build out plus 75 years, and 4,857 acrcs at full build out plus 200 years.
Additional Mitigation					
Same as the Proposed Aetion.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
Potential Residual Impacts					
• The COM Plan could be effective in reducing impacts to public lands available for disposal (4,926 acrcs). Lands for disposal would include 4,926 acres (Alternatives A and C), 7,255 acres (Alternative B), 915 acres (Alternative D), nad 107 acres (Alternatives E and F). One relevant objective of the COM Plan to public lands available for disposal is to identify triggers for early warning of potential adverse impacts that would act as indicators for groundwater drawdown thresholds. Drawdown of groundwater levels would affect public lands available for disposal, which could reducc the value of lands for disposal. It is not possible to determine the level of impact reduction at this time. Residual effects on public lands available for disposal could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to public lands available for disposal could oecur at some locations.					

3.8.2.11 No Action

For the No Action alternative, the ROWs would not be granted and the project would not be constructed as planned. Howcver, other ongoing projects and activities could continue to impact groundwater levels. Projected drawdown impacts to lands available for disposal are summarized in **Table 3.8-17**. Projected drawdown impacts to private agricultural lands are summarized in **Table 3.8-18**.

Table 3.8-17 Potential Impacts to Lands Available for Disposal for No Action Drawdown (Acres)

Basin	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Beryl-Enterprise Area	0	0	21
Clover Valley	2,659	2,659	5,227
Lower Meadow Valley Wash	4,583	5,176	5,176
Panaca Valley	2,955	10,871	14,180
Patterson Valley	809	10,689	10,812
Snake Valley	0	0	0
Spring Valley	0	0	0
White River Valley	0	216	216
Total	**11,006**	**29,612**	**35,632**

Note: Due to rounding, the totals may be different than the sum of individual acres.

Table 3.8-18 Potential Impacts to Private Agricultural Lands for No Action Drawdown (Acres)

Basin	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Lower Meadow Valley Wash	282	282	282
Snake Valley	0	0	0
Spring Valley	748	1,654	1,691
Other Valleys	4,316	12,267	12,940
Total	**5,346**	**14,204**	**14,913**

Note: Due to rounding, the totals may be different than the sum of individual acres.

3.8.3 Cumulative Impacts

3.8.3.1 Impacts Common to All Alternatives

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Land Use

Changes in climate are currently impacting landscapes of the Southwest and this trend is projected to increase in the coming decades. Higher temperatures, increased drought, and more intense thunderstorms will very likely decrease the cover of vegetation that protects the ground surface, increase erosion, and promote invasion of exotic grass species in arid landscapes. Climate change will also likely create physical conditions conducive to wildfire, including the proliferation of exotic grasses, thus causing fire frequencies to increase. In areas such as the Mojave Basin ecoregion which has not coevolved with fire, the probability of loss of iconic, charismatic megaflora such as Joshua trees is very likely. In addition, river and riparian ecosystems in the GWD Project area will very likely be negatively impacted by decreased stream flow, increased water removal, and greater competition from non-native species (Ryan et al. 2008).

Crop responses in a changing climate reflect the interplay among three factors: changing temperatures, increasing CO_2 concentrations, and changing water resources. Higher temperatures will mean a longer growing season for crops that do well in the heat but a shorter growing season for crops more suited to cooler conditions. Higher temperatures also cause plants to increase water use water to keep cool. Higher CO_2 levels generally cause plants to grow larger. For some crops, this is not necessarily a benefit because they are often less nutritious, with reduced nitrogen and protein content. Water resources are critical for crop production, as plants need adequate water to maintain their temperature within an optimal range. Without water for cooling, plants will suffer heat stress. In many regions, irrigation water is used to maintain adequate temperature conditions for the growth of cool season plants (such as many vegetables), even in warm environments. With increasing demand and competition for freshwater supplies, the water needed for these crops might be increasingly limited. If water supply variability increases, it will affect plant growth and cause drastically reduced yields. The amount and timing of precipitation length of the growing season are also critical factors and will likely be significantly affected by climate change (Hatfield et al. 2008).

Climate change could affect land use and agriculture in the GWD Project Area by impacting:

- Temperature and atmospheric CO_2: while some crops show positive responses to elevated CO_2 and lower levels of warming, higher levels of warming often negatively affect growth and yields.
- Precipitation: extreme events such as heavy downpours and droughts are likely to reduce crop yields because excesses or deficits of water have negative impacts on plant growth.
- Invasive species: weeds, diseases, and insect pests benefit from warming and weeds also benefit from a higher CO_2 concentration, increasing stress on crop plants and requiring more attention to pest and weed control.

3.8.3.2 Issues

Groundwater Field Development

Construction and Facility Maintenance

- Surface disturbance could be inconsistent with other local, state, and federal land use plans.
- Land ownership adjustments could be limited by the project land uses and aboveground facilities. Residences within 1 mile of development areas could be affected by construction, operation, and maintenance.
- Agricultural lands could be altered by construction or converted to permanent facilities.
- Surface disturbance could occur outside of areas determined compatible for development, including utility corridors, and may encroach on ROW exclusion or avoidance areas.

Groundwater Pumping

- Groundwater pumping could affect future land ownership uses.
- Groundwater pumping could affect the water that is available for agricultural irrigation.

3.8.3.3 Assumptions

Groundwater Field Development

Construction and Facility Maintenance

- Identification of the effects on land uses focused on those areas that would be disturbed by construction of facilities or in which land use changes would occur as a result of the proposed project.
- No agricultural lands would be disturbed by construction or converted to permanent facilities.
- Department of Defense lands would not be used for the project.
- Facilities would not be approved in identified ROW exclusion areas. If facilities were approved in these areas, an RMP amendment would be required.

Groundwater Pumping

- Because the exact locations of the wells and associated facilities that would be needed for pumping are unknown at this stage of the project, impact discussions are qualitative and general for effects in Snake, Spring, Delamar, Dry Lake, and Cave valleys.
- Agricultural lands are assumed to be the land use category that would be affected by groundwater drawdown.

3.8.3.4 Methodology for Analysis

The cumulative impacts of construction of the GWD Project should take into account all surface-altering actions that would be likely to occur and that might affect current and future uses of the land in the project region. Using the impact analysis for the ROWs and groundwater development areas, impacts from other RFFAs identified in Chapter 2 were considered. Any potential conflicts or conversion of existing land uses would be identified as an impact. Acreage of surface disturbance for RFFAs was estimated using best available information.

3.8.3.5 No Action

For the No Action alternative, the ROWs would not be granted and the project would not be constructed as planned. However, other planned projects and activities would occur that would draw down groundwater levels. Cumulative drawdown impacts to lands available for disposal are summarized in **Table 3.8-19**. Projected drawdown impacts to private agricultural lands are summarized in **Table 3.8-20**.

Table 3.8-19 Lands Available for Disposal Affected by 10-foot Groundwater Drawdown from Pumping of all Existing and RFFA Projects – No Action (Acres)

Basin	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Beryl-Enterprise Area	0	21	21
Clover Valley	3,635	9,956	10,047
Lower Meadow Valley Wash	5,036	5,176	5,176
Panaca Valley	6,218	16,435	20,156
Patterson Valley	809	10,689	10,812
Snake Valley	0	0	0
Spring Valley	0	0	0
White River Valley	0	216	216
Total	**15,698**	**42,493**	**46,428**

Table 3.8-20 Private Agricultural Lands Affected by 10-foot Groundwater Drawdown from Pumping of all Existing and RFFA Projects – No Action (Acres)

Basin	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Lower Meadow Valley Wash	282	283	391
Snake Valley	0	0	0
Spring Valley	748	1,654	1,691
Other Valleys	8,361	15,984	17,976
Total	**9,391**	**17,921**	**20,058**

3.8.3.6 Proposed Action

The majority of land use in the project area is undeveloped open land. Projects with a permanent aboveground component, such as buildings, pavement, power poles, or stations, would have more impacts on land use than projects with an underground component because the aboveground component could preclude use of the land for the foreseeable future. Underground components of any project would temporarily preclude use of the land during construction, but in many cases, land could revert to its preconstruction use after the facilities are built. So long as the construction of new facilities complies with existing land use plans, no additional impacts to land use are anticipated. Depending on the acreage of surface disturbance and the timing of construction, the other surface-disturbing activities that are necessary to implement the RFFAs could result in additional acreage of impacts, similar to those discussed under the Proposed Action.

The land within the 10-foot groundwater-drawdown areas have been estimated from the implementation of all reasonably foreseeable pumping projects in the region (discussed in Chapter 2). The acreage of public lands available for disposal that could be affected by groundwater drawdown is listed in **Table 3.8-21**. While these disposal areas may be less desirable for parks, open space, or agriculture, other community uses such as active recreation or industrial uses would still be compatible in these areas if acquisition of these lands is pursued. Therefore, while these lands may be less desirable for some uses, the potential future disposal of these lands would not be precluded. The acreage of private agricultural lands that could be affected by groundwater drawdown is listed in **Table 3.8-22**. This may reduce the value of lands for disposal and agricultural uses, which is discussed further in Section 3.18, Socioeconomics and Environmental Justice.

Table 3.8-21 Lands Available for Disposal (Acres) Potentially Affected by Groundwater Pumping (10-foot Drawdown Contour) for No Action Cumulative, Proposed Action, and Cumulative with the Proposed Action[1]

Affected Valley	Cumulative with No Action			Proposed Action			Cumulative with Proposed Action		
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200Years
Clover	3,635	9,956	10,047	0	0	0	3,635	9,956	10,047
Lower Meadow Valley Wash	5,036	5,176	5,176	0	0	0	5,036	5,176	5,176
Panaca	6,218	16,435	20,156	0	0	473	6,218	16,682	20,403
Patterson	809	10,689	10,812	0	0	0	809	10,689	10,812
Snake	0	0	0	0	4,819	4,819	0	4,819	4,819
Spring	0	0	0	0	107	107	107	107	107
White River	0	216	216	0	0	0	0	216	216
Total	**15,698**	**42,472**	**46,407**	**0**	**4,926**	**5,399**	**15,804**	**47,645**	**51,580**

[1] Acreages are based on drawdown models outputs and are not additive. Information presented in approximate and intended to display incremental effects of the project in relation to other project in the region.

Table 3.8-22 Private Agricultural Lands (Acres) Potentially Affected by Groundwater Pumping (10-foot Drawdown Contour) for No Action Cumulative, Proposed Action, and Cumulative with the Proposed Action[1]

Affected Valley	Cumulative with No Action			Proposed Action			Cumulative with Proposed Action		
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200Years
Lower Meadow Valley Wash	282	283	391	0	0	11	282	293	400
Snake	0	0	0	0	11,086	12,012	0	11,089	12,199
Spring	748	1,654	1,691	1,206	4,706	5,180	3,719	4,817	5,606
Other Valleys	8,361	15,984	17,976	0	0	0	8,361	15,984	18,027
Total	**9,391**	**17,921**	**20,058**	**1,206**	**15,792**	**17,203**	**12,362**	**32,183**	**36,232**

[1] Acreages are based on drawdown models outputs and are not additive. Information presented in approximate and intended to display incremental effects of the project in relation to other project in the region.

Conclusion. Cumulatively, approximately 15,804 acres of public land available for disposal would be affected by the drawdown of groundwater levels at full build out, 47,645 acres at full build out plus 75 years, and 51,580 acres at full build out plus 200 years. The Proposed Action would contribute all of the incremental effects on disposal lands in Snake and Spring valleys for cumulative pumping at full build out plus 75 years and full build out plus 200 years. This alternative also would contribute approximately 1 percent of the cumulative impacts for disposal lands in Panaca Valley at full build out plus 200 years. No Action pumping contributes all of the cumulative effects on disposal lands in Clover, Lower Meadow Valley Wash, Patterson, and White River valleys. Approximately 12,362 acres of private agricultural land would be affected by the drawdown of groundwater levels at full build out, 32,183 acres would be affected at full build out plus 75 years, and 36,232 acres would be affected at full build out plus 200 years. The Proposed Action also would contribute all of the incremental effects on private agricultural lands under cumulative pumping in Snake Valley at full build out plus 75 years and full build out plus 200 years. This alternative would contribute between 32 and 98 percent of the cumulative effects on private agricultural lands in Spring Valley for the 3 model periods. In Lower Meadow Wash, Proposed Action pumping would contribute approximately 3 percent of the cumulative effects on private agricultural land. This may reduce the value of lands for disposal and agricultural uses, which is discussed further in Section 3.18, Socioeconomics and Environmental Justice.

3.8.3.7 Alternatives A through F

Table 3.8-23 summarizes the impacts arising from construction, operation, and maintenance of the groundwater development areas for Alternatives A through F, as compared to the Proposed Action.

Table 3.8-23 Summary of Land Use Impacts and Lands Affected by 10-Foot Groundwater Drawdown from Pumping of All Existing Projects, RFFAs, and Alternatives A through F

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Potential Cumulative Impacts of Pumping					
Impacts to lands available for disposal would be the same as the Proposed Action. Fewer acres of private agricultural land would be affected: 11,588 acres at full build out, 31,220 acres at full build out plus 75 years, and 33,476 acres at full build out plus 200 years. The patterns of incremental contribution from Alternative A on overall cumulative effects on land use parameters would be the same as the Proposed Action. The alternative would contribute effects in Snake, Spring, Panaca, and Lower Meadow Valley Wash. The magnitude of contribution would be lower than the Proposed Action.	Impacts to lands available for disposal would be the same as the Proposed Action. Acreage affected at full build out plus 200 years would increase by 247 acres. Fewer acres of private agricultural land would be affected: 11,999 acres at full build out, 30,449 acres at full build out plus 75 years, and 33,476 acres at full build out plus 200 years. The patterns of incremental contribution from Alternative B on overall cumulative effects on land use parameters would be the same as the Proposed Acton. The alternative would contribute effects to the same basins as noted for the Proposed Action. The magnitude of incremental effects is noted in the Proposed Action, but impacts to private agricultural lands would be lower than the Proposed Action.	Impacts to lands available for disposal would be the same as the Proposed Action. Fewer acres of private agricultural land would be affected: 11,588 acres at full build out, 29,891 acres at full build out plus 75 years, and 32,697 acres at full build out plus 200 years. The patterns of incremental contribution from Alternative C on overall cumulative effects on land use parameters would be the same as the Proposed Action. The alternative would contribute effects in the same basins as noted for the Proposed Action. The magnitude of incremental effects is noted in the Proposed Action, but impacts to private agricultural lands would be lower than the Proposed Action.	Impacts to lands available for disposal would be similar to, but less than the Proposed Action: 2,961 fewer acres at full build out, 5,469 fewer acres at full build out plus 75 years, and 4,838 fewer acres at full build out plus 200 years. Fewer acres of private agricultural land would be affected: 9,043 acres at full build out, 19,228 acres at full build out plus 75 years, and 23,784 acres at full build out plus 200 years. Patterns of incremental contributions and affected basins were the same as the Proposed Action. The magnitude of incremental effects from Alternative D would be less than the Proposed Action.	Impacts to lands available for disposal would be similar to, but less than the Proposed Action: 4,819 fewer acres at full build out plus 75 years and 4,820 fewer acres at full build out plus 200 years. Fewer acres of private agricultural land would be affected: 11,588 acres at full build out, 20,178 acres at full build out plus 75 years, and 22,285 acres at full build out plus 200 years. Patterns of incremental contributions and affected basins would be the same as the Proposed Action except for no impacts to disposal lands and private agricultural lands in Snake Valley. The magnitude of incremental effects from Alternative E would be less than the Proposed Action.	Impacts to lands available for disposal would be similar to the Proposed Action: 15,804 acres at full build out, 42,847 acres at full build out plus 75 years, and 46,871 acres at full build out plus 200 years. Fewer acres of private agricultural land would be affected: 11,801 acres at full build out, 20,978 acres at full build out plus 75 years, and 23,112 acres at full build out plus 200 years. Patterns of incremental contributions and affected basins would be the same as the Proposed Action except for no impacts to disposal lands and private agricultural lands in Snake Valley. The magnitude of incremental effects from Alternative F would be less than the Proposed Action.

3.9 Recreation

3.9.1 Affected Environment

3.9.1.1 Overview

Recreation areas were identified using BLM land-ownership and recreation management area data as well as NDOW data. Dispersed recreation, primarily OHV use, occurs throughout the region of study, since all public land is available for recreation unless otherwise restricted. Designated recreation sites near the proposed GWD Project are shown in **Figure 3.9-1**. Other special designations that might have recreational values, such as designated wilderness and ACECs, are discussed in Section 3.14, Special Designations.

QUICK REFERENCE

ACM – Applicant Committed Protection Measures

NDOW – Nevada Division of Wildlife

OHV – Off-Highway Vehicle

RMP – Resource Management Plan

SRMA – Special Recreation Management Area

SRP – Special Recreation Permit

WMA – Wildlife Management Area

3.9.1.2 Region of Study

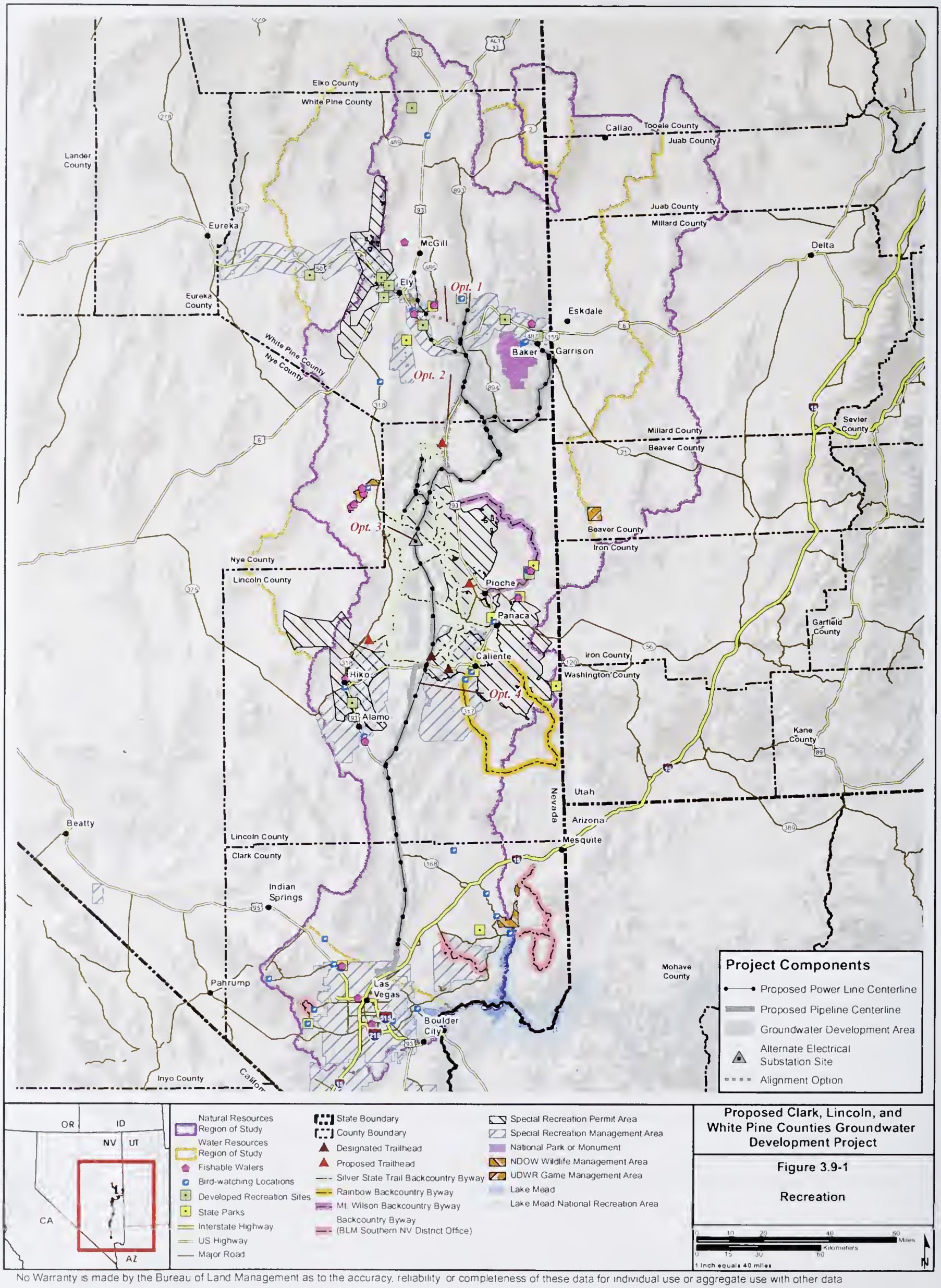
The region of study for recreation includes all lands within 5 miles of the ROWs and ancillary facilities and groundwater development areas, as well as recreation areas in the hydrologic basins that might be affected by groundwater drawdown. Five miles was determined to be a reasonable distance to capture potential impacts to the recreation experience associated with construction noise, equipment operation, and increased human presence. Indirect effects to the recreation experience associated with visual impacts are discussed in Section 3.15, Visual Resources.

The mountains and valleys between Ely and Las Vegas contain ecologically diverse habitats and varied terrain that offer a range of recreational opportunities. Recreational activities in the region of study typically consist of casual and dispersed uses including OHV use, hunting, fishing, camping, hiking, horseback riding, caving, geocaching, rock climbing, mountain biking, cultural tourism, bird watching, nature photography, and natural resource interpretation. Seasonal use of OHV trails typically occurs from late March through October in the Great Basin portion of the project area with heavier winter use in the Mohave Desert portion. OHV use on public lands is restricted to designated roads and trails but generally occurs throughout the year. The hunting seasons for various big-game species typically occur between August and mid-December.

Visitation Statistics. Public lands in the region of study receive an estimated average of about 2 million visits annually for OHV use, hiking, hunting, and fishing. Great Basin National Park averages 90,000 visitors each year.

In areas where recreation on public lands is the targeted use, the BLM designates SRMAs. A SRMA is an area in which more-intensive management is needed and recreation is a principal objective for management by the BLM. A SRMA might include developed and primitive recreation sites. In addition to opportunities on BLM lands, the region offers a variety of recreation activities on USFS lands, state parks, and National parks and monuments.

GBNP brings many visitors to the area for hiking, fishing, caving, seclusion, and cultural sites. The caves in the GBNP receive considerable recreational use each year. While the park receives nearly 90,000 visitors annually, Lehman Cave receives nearly 35,000 visitors annually (Dickinson 2010). Caves in the Baker Creek watershed (Ice, Crevasse, Halliday's Deep, and Wheeler's Deep) and the Lehman Creek watershed (Lehman and Little Muddy) are the focus of most of the park visitation. The Snake Creek Cave in the Snake Creek watershed receives the highest visitation of any wild (i.e., primitive) cave (NPS 2008).



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual use or aggregate use with other data

Recreational use of caves occurs at scattered locations throughout the region. Some popular caves are concentrated near Baker and Ely, but another well-known cave is the Cave Valley Cave in Cave Valley. Some Snake Valley caves are proposed SRMAs. These caves are important to paleontological, cultural, or Native American values (BLM 2007).

Recreation areas within the region of study are summarized in **Table 3.9-1** and shown in **Figure 3.9-1**.

Table 3.9-1 Recreation Areas within the Region of Study

Responsible Agency	Recreation Area	Total Area Size (acres)	Recreation Experience	Crossed by ROW or Ancillary-Facilities	Within Groundwater Development Area
BLM	Alamo SRP	283,884	Opportunities for competitive motorcycle special recreation permit events.	No	No
BLM	Big Dune SRMA	11,600	Managed for moderate, casual OHV use, camping, and other casual recreation opportunities.	No	No
BLM	Caliente SRP	426,598	Opportunities for competitive motorcycle special recreation permit events.	Yes	Yes
BLM	Chief Mountain SRMA	110,839	A broad recreation opportunity spectrum ensuring a balance of recreation experiences.	Yes	Yes
BLM	Cleve Creek Campground	~5	A group camping site and bird watching area with large barbecue area nestled amongst cottonwood canopy along Cleve Creek.	No	No
BLM	Egan Crest SRMA	53,455	Managed to ensure a balance of recreation experiences.	No	No
BLM	Ely Elk Viewing Area	~1 mile	A corridor dedicated to allow visitors a chance to stop and view elk from their vehicles. Hawks, ravens, and eagles perch on poles along the highway, and golden eagles are common year-round.	No	No
BLM	Ely SRP	213,823	Opportunities for competitive motorcycle special recreation permit events.	No	No
BLM	Jean Lake/Roach Lake SRMA	216,300	Managed for intensive recreation opportunities, including competitive OHV and other recreational events, as well as dispersed recreational use and commercial activities, while minimizing impacts to the BLM-sensitive white-margined penstemon.	No	No
BLM	Las Vegas Valley SRMA	197,300	In coordination with county and city governments facilitate the provision of open space areas, recreational trails, and parks necessary for valley residents.	Yes	No
BLM	Laughlin SRMA	25,600	Provide a higher level of management emphasis through increased use monitoring, ranger patrols, increased BLM presence at permitted events, and increased coordination with local government and businesses for recreational uses.	No	No
BLM	Loneliest Highway SRMA	548,567	A broad recreation opportunity spectrum ensuring a balance of recreation experiences. Contains popular recreation destinations such as Illipah Reservoir, Cold Creek Reservoir, Garnet Hill Rockhounding Area, and the Pony Express Trail.	Yes	Yes
BLM	Meadow Valley Recreation Site	40	Developed campground.	No	No

Table 3.9-1 Recreation Areas within the Region of Study (Continued)

Responsible Agency	Recreation Area	Total Area Size (acres)	Recreation Experience	Crossed by ROW or Ancillary-Facilities	Within Groundwater Development Area
BLM	Mount Wilson Backcountry Byway	65 miles	Distinct and diverse road that provides unique niche in providing an "off-the-beaten-path" experience through diverse landscape settings.	No	No
BLM	Muddy Mountains SRMA	123,400	Offers semi-primitive recreation opportunities and integrated management of wildlife habitat, cultural resources, and other recreational uses.	No	No
BLM	Nellis Dunes SRMA	10,000	Offers an open area for intensive off-road vehicle and other recreation opportunities, including organized OHV events, casual OHV free play, picnicking, photography, and other non-OHV commercial and competitive permitted activities.	No	No
BLM	Nelson/Eldorado SRMA	81,600	Offers competitive OHV events in accordance with desert tortoise protection requirements.	No	No
BLM	North Delamar SRMA	199,704	Provides a broad recreation opportunity spectrum ensuring a balance of recreation experiences.	No	Yes
BLM	Oak Springs Trilobite Trail	< 1mile	Maintains a non-motorized trail with interpretative information at the trailhead.	No	No
BLM	OHV Race Routes	> 745 miles	Offers competitive OHV high-speed events.	Yes	Yes
BLM	Pahranagat SRMA	289,945	Offers a broad recreation opportunity spectrum ensuring a balance of recreation experiences.	No	No
BLM	Pioche SRP	402,331	Offers opportunities for competitive motorcycle special recreation permit events.	Yes	Yes
BLM	Rainbow Backcountry Byway	120 miles	Offers a distinct and diverse road that offers an "off-the-beaten-path" adventure through diverse landscape settings.	No	No
BLM	Silver State OHV Trail Backcountry Byway	358 miles	Offers a distinct and diverse road that offers an "off-the-beaten-path" adventure through diverse landscape settings.	Yes	Yes
BLM	Sunrise Mountain SRMA	37,620	Offers recreation opportunities in concert with sensitive plant, scenic, cultural, and geologic values of the concurrent ACEC.	No	No
NGO	David E. Moore Bird Sanctuary	162	Offers an historic ranch with a rich, mixed bird community characteristic of the zone where the pinyon-juniper forests of the Great Basin foothills meet the desert shrub community. Most noteworthy is a population of long-billed curlews.	No	No
NPS	GBNP	77,100	Offers cave tours, scenic drives, nature trails, camping, fishing, wildlife viewing, cultural tourism.	No	No

Table 3.9-1 Recreation Areas within the Region of Study (Continued)

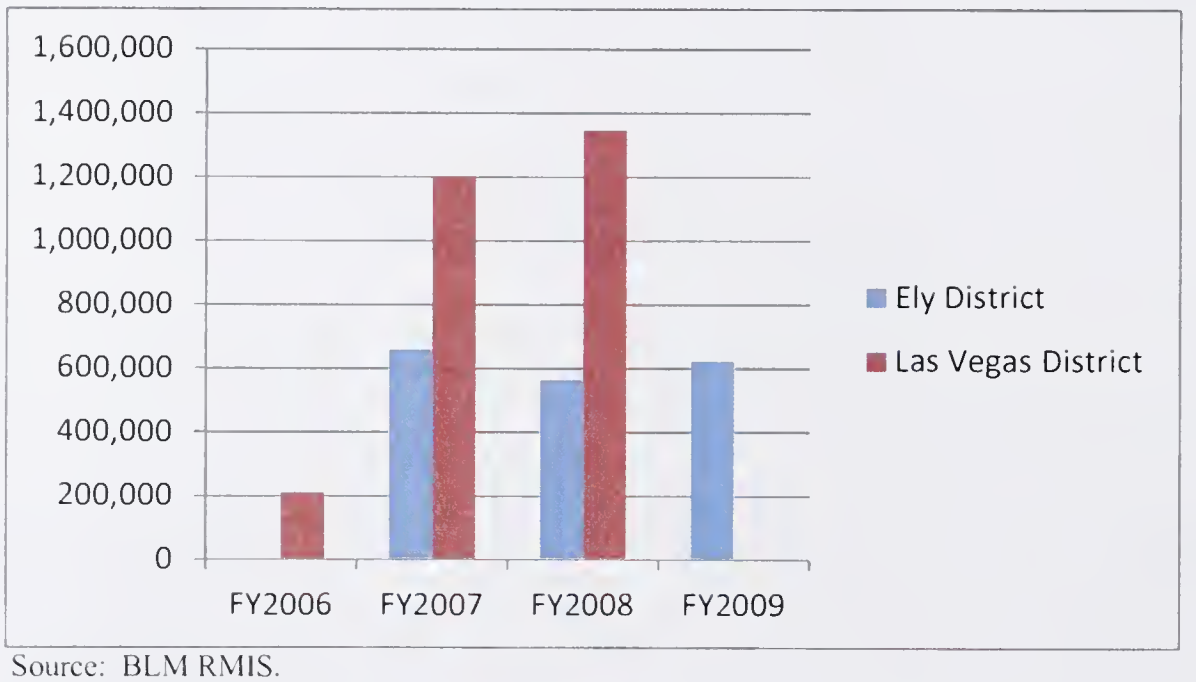
Responsible Agency	Recreation Area	Total Area Size (acres)	Recreation Experience	Crossed by ROW or Ancillary-Facilities	Within Groundwater Development Area
NPS	Lake Mead National Recreation Area	~1.5 million	Offers year-round recreational opportunities. Its lakes cater to boaters, swimmers, and fishermen while its desert rewards hikers, wildlife photographers, and roadside sightseers.	No	No
NV	Beaver Dam State Park	2,393	Offers a popular area for hikers and nature enthusiasts who enjoy its primitive and rustic character. Facilities include campgrounds, a group use area, a day-use picnic area, and hiking and interpretive trails.	No	No
NV	Cathedral Gorge State Park	1,573	Offers trails, scenic, shaded picnic areas, and a tree-shaded campground area with opportunities for hiking, picnicking, camping, nature study, and photography.	No	No
NV	Cave Lake State Park	4,291	Offers campgrounds, picnic areas, hiking trails and a boat launch at a 32-acre reservoir popular for trout fishing, crawdadding, boating, hiking, picnicking and camping, scenic views, opportunities for nature study and photography, and winter sports such as ice fishing, cross-country skiing, ice skating, and snow sculpting.	No	No
NV	Echo Canyon State Park	665	Offers a 65-acre reservoir with a campground, picnic area, group use facilities and boat launch popular for camping, fishing, hiking and scenery.	No	No
NV	Floyd Lamb State Park	2,040	Offers day-use area with picnicking and fishing.	No	No
NV	Kershaw-Ryan State Park	239	Offers picnic area, restrooms and trails for nature study, photography, picnicking, and hiking.	No	No
NV	Key Pittman WMA	1,332	Offers lakes, waterfowl, and public hunting grounds.	No	No
NV	Spring Mountain Ranch State Park	520	Offers an historic ranch and picnicking area.	No	No
NV	Spring Valley State Park	1,111	Offers boat launching, picnicking and camping facilities. Visitors also enjoy hiking, exploring, and touring the historic Ranch House museum.	No	No
NV	Steptoe Valley WMA	6,426	Offers sightseeing, wildlife observation, photography, hiking, educational/scientific activities, fishing, boating, and hunting.	Yes	No
NV	Valley of Fire State Park	40,936	Offers popular activities including camping, hiking, picnicking, and photography.	No	No
NV	Ward Charcoal Ovens State Park	819	Offers opportunities for hiking, mountain biking, OHV riding, wildlife viewing, birding, fishing, picnicking, and camping. Known for its six beehive-shaped historic charcoal ovens.	No	No

Table 3.9-1 Recreation Areas within the Region of Study (Continued)

Responsible Agency	Recreation Area	Total Area Size (acres)	Recreation Experience	Crossed by ROW or Ancillary-Facilities	Within Groundwater Development Area
NV	Wayne E. Kirch WMA	14,815	Offers lakes, wetlands, waterfowl, and public hunting grounds.	No	No
USFWS	Desert National Wildlife Range	1,600,000	Offers wildlife viewing including desert tortoise and desert bighorn sheep.	No	No
USFWS	Fish Springs National Wildlife Refuge	17,992	Offers wildlife viewing for migrating wetland birds.	No	No
USFWS	Pahranagat NWR	5,308	Offers wildlife viewing for migratory birds and threatened and endangered species including desert tortoise and southwestern willow flycatcher.	No	No
USFWS	Moapa Valley National Wildlife Refuge	117	Offers wildlife viewing for Moapa dace and other endangered, threatened, and candidate species.	No	No
UT	Indian Peaks State Game Management Area	10,240	Offers public hunting for mule deer and trophy bull elk habitat; fishing for rainbow trout.	No	No

NGO – Non-governmental Organizations.

Usage data on the majority of the recreation sites in **Table 3.9-1** are unavailable because of the unstructured nature of the sites' use and the expansive area covered by the sites. Best available data on recreation use is recorded in the BLM's *Recreation Management Information System* (RMIS) (**Figure 3.9-2**). Recreation use data is collected at 18 sites in the BLM Ely District and 13 sites in the BLM Las Vegas District. Recreation data are collected at select dispersed location areas and developed recreation sites (such as information centers, trailheads, campgrounds, and picnic areas). According to RMIS data recorded over a 3-year period from 2007-2009, there was an average of 615,299 visits to public land in the BLM Ely District. The BLM Las Vegas District receives much higher visitation given the proximity of public lands to the Las Vegas area. According to RMIS data recorded over a 2-year period from 2007-2008, there was an average of 1,273,899 visits to public land in the BLM Las Vegas District. While RMIS data provides a good reference of approximate recreation use, it is anticipated that RMIS data greatly underestimates total visitation to public lands.



Source: BLM RMIS.

Figure 3.9-2 Recreation Use Data on Public Lands in the Region of Study (Number of Visits)

In addition to the recreation areas identified in **Table 3.9-1**, visitors use public lands for a variety of hunting and fishing activities. Several fishable reservoirs, lakes, and ponds exist within the region (**Table 3.9-2**) (NDOW 2009a); Section 3.7, Aquatic Biological Resources, describes additional game-fish streams. Many of the lower-elevation ponds and reservoirs present opportunities to catch rainbow trout, catfish, bluegill, crappie, and largemouth bass. Angling opportunities at higher-elevation lakes and ponds consist of mostly rainbow and brown trout. Campgrounds often are located around fishable ponds and reservoirs, providing additional recreational opportunities. Other BLM-designated recreation areas include surface-water features as part of their recreational use and management. For example, the Ash Springs Recreation Site, located approximately 7 miles north of Alamo in the community of Ash Springs, involves uses such as soaking in a natural hot spring and picnicking (BLM 2007).

Table 3.9-2 Fishable Water Bodies in the Region of Study

Water Body	County
Floyd Lamb Park Pond	Clark
Lorenzi Park Pond	Clark
Sunset Park Pond	Clark
Eagle Valley Reservoir	Lincoln
Echo Canyon Reservoir	Lincoln
Nesbitt Lake	Lincoln
Upper Pahranagat Lake	Lincoln
Adams-McGill Reservoir	Nye
Cold Springs Reservoir	Nye
Dacey Reservoir	Nye
Haymeadow Reservoir	Nye
Bassett Lake	White Pine
Cave Lake	White Pine
Comins Reservoir	White Pine
Silver Creek Reservoir	White Pine
Sacramento Pass Recreation Area	White Pine
Baker Lake, GBNP	White Pine
Pruess Lake	Millard County, Utah

The number of sales of hunting and fishing licenses and stamps sold in 2004 through 2005 are presented in **Table 3.9-3** (BLM 2007). Hunting for upland game birds and for ducks is popular within the GWD Project region. Big-game hunters hunt mostly elk, bighorn sheep, mule deer, and pronghorn. Mule deer was the most-hunted species in the 2004-2005 season, whereas bighorn sheep was the least hunted (NDOW 2008).

Table 3.9-3 Hunting and Fishing Licenses and Stamps by County: 2004–2005

License Category	Clark	Lincoln	White Pine
Resident fishing	36,833	1,250	2,175
Non-resident fishing	10,906	179	784
Total Fishing Licenses	**47,739**	**1,429**	**2,959**
Trout stamp	18,146	985	2,296
Resident hunting	5,774	314	360
Non-resident hunting	260	29	31
Total Hunting Licenses	**6,034**	**343**	**391**
Duck stamp	1,174	47	130
Upland game bird stamp	4,172	132	418
Hunting/fishing combination	7,438	361	851

Source: NDOW 2009b and Final EIS (BLM 2007).

Rights-of-way and Ancillary Facilities

The proposed project ROWs or ancillary facilities would cross three SRMAs, two SRP areas, OHV race routes, the Silver State OHV Trail Backcountry Byway, and one state WMA. All except the WMA are BLM-administered areas primarily used for motorized-based recreation. The three SRMAs—Chief Mountain, Loneliest Highway, and Las Vegas Valley SRMAs—are large areas (between 100,000 and 550,000 acres) that provide a broad recreation opportunity spectrum. The two SRP areas—Caliente and Pioche SRP areas—are large areas (greater than 400,000 acres) that provide opportunities for competitive motorcycle special recreation permit events. The OHV race routes (more than 745 miles) cater to competitive OHV high-speed events, while the Silver State OHV Trail Backcountry Byway (358 miles) accommodates casual off-road uses. The Steptoe Valley WMA, a 6,426-acre area administered by the State of Nevada, provides opportunities for wildlife-based recreation including wildlife viewing, fishing, and hunting.

Groundwater Development Areas

Four SRMAs, two SRP areas, OHV race routes, and the Silver State OHV Trail Backcountry Byway fall within the groundwater development area boundaries. All areas also are crossed by the ROWs or ancillary facilities discussed in the previous section. In addition to the Chief Mountain, Loneliest Highway, and Las Vegas Valley SRMAs; the North Delamar SRMA (an area of 200,000 acres and similar recreation experiences) would be affected.

3.9.2 Environmental Consequences

3.9.2.1 Rights-of-way

Issues

- Effects on recreation areas (e.g., SRMAs, Silver State Off-highway Vehicle Trail, National Parks) and dispersed recreation activities (e.g., biking, camping, OHV use, special events).
- Increased proliferation of OHV routes and unauthorized OHV use on ROWs.
- Conflicts with hunting or wildlife-based recreation on public and private lands.

Assumptions

- Project actions would influence popular dispersed recreation activities in the region and hinder access to popular recreation areas.
- BLM management prescriptions and guidance would be followed.

Methodology for Analysis

- Quantification of recreation areas and trails that would be crossed by the ROWs and ancillary facilities.
- Qualitative identification of overlap and potential conflicts between recreational seasons and construction activities.
- Identification of areas in which ROWs would be accessible by existing OHV trails.
- Identification of recreation sites within 5 miles of ROWs and ancillary facilities, as well as other recreation areas that might have limited accessibility because of project construction and facility maintenance.

3.9.2.2 Proposed Action, Alternatives A through C

Construction and Facility Maintenance

Impacts to Recreation Areas and Dispersed Recreation Activities

Table 3.9-4 provides a summary of temporary and permanent surface disturbance to ROWs within designated recreation areas. Surface disturbance, noise, and visual presence of other people during construction in these areas would detract from the natural character of the area and diminish the recreation experience on a short-term basis. While all recreation use types would be affected, impacts from construction activities would be greater for non-motorized uses. Long-term adverse impacts to recreation in these areas would result from alteration of the recreation setting in areas with aboveground structures and vegetation alteration. Any increase in traffic associated with operations and maintenance, even in remote areas of the ROW, would likely be unnoticeable by recreationists in the area.

The surface disturbance that would occur in the recreation areas would comprise <1 percent of any individual recreation area and impacts would be localized. However, the ROW and ancillary facilities pass through the western-most edge the Chief Mountain SRMA and Caliente SRP area and intersect the Pioche SRP area, which would separate the western-most 10 percent of the SRP area from the remaining 90 percent. Along with the multiple crossings of the Silver State Off-highway Vehicle Trail Backcountry Byway by construction activities in Delamar, Dry Lake, and Cave valleys, this disturbance could temporarily reduce public access to recreational trails. Because these SRP areas are used for motorcycle and truck racing, the construction of the project ROWs could interfere with racing events. Where the corridor passes through the Steptoe Valley WMA, the proposed power line would be within an existing designated utility corridor. While the recreation setting would be altered in this area, the power line would be compatible with approved management direction.

Table 3.9-4 Summary of Potential Surface Disturbance in Recreation Areas from Construction of Rights-of-way and Ancillary Facilities (Acres), Proposed Action and Alternatives A through C

Recreation Area	Surface Disturbance (Acres)	Permanent Surface Disturbance in ROWs (Acres)
Caliente SRP	239	87
Chief Mountain SRMA	178	42
Las Vegas Valley SRMA	184	15
Loneliest Highway SRMA	695	58
Pioche SRP	1,148	55
Steptoe Valley WMA	4	0
Total	**2,448**	**257**

Many of the proposed ROWs either cross or are within several OHV race routes commonly used for motorcycle or truck race events throughout the year. The OHV race routes occur throughout Cave, Delamar, Dry Lake, and Steptoe valleys. This overlap could limit or preclude the use of these routes during construction.

In addition to those areas that would be directly affected, several other recreation areas could experience indirect effects from the construction of the ROWs and ancillary facilities. Reduced access and diminished opportunities for dispersed recreation might occur in those designated recreation areas adjacent to but not intersected by the ROWs. Construction of ancillary facilities could reduce the quality of recreational experiences, displace recreation users to other areas, or eliminate some recreation opportunities in localized areas. These areas, and the potential effects from construction, are listed in **Table 3.9-5**.

Table 3.9-5 Evaluation of Potential Construction Impacts to Recreation Areas Near Rights-of-way and Ancillary Facilities

Recreation Area	Intersects ROW or Ancillary Facility	Potential Impact
Caliente SRP	Yes	• Temporarily reduce public access to recreational trails, delay or interfere with racing events, and potentially displace users to other areas during construction
Cave Lake State Park	No	• Additional construction traffic may hinder access on SH 486 • Additional lighting and construction activity could affect nearby recreational setting and views from the area
Chief Mountain SRMA	Yes	• Temporarily reduce public access to recreational trails and potentially displace users to other areas during construction
Chief Mountain West Trailhead	No, but near trailhead	• Temporarily reduce public access to trailhead and adjacent trails • Diminished recreational experience because of a pipeline staging area within 0.25 mile of trailhead • Potentially displace users to other areas during construction
Ely Elk Viewing Area	No	• Disturbance to elk during construction could reduce opportunities for elk viewing
Kershaw-Ryan State Park	No	• Potentially impaired access caused by active construction traffic on SH 317 as well as U.S. 93 to the construction-support site near Caliente that could cause unanticipated delays to visitors

Table 3.9-5 Evaluation of Potential Construction Impacts to Recreation Areas Near Rights-of-way and Ancillary Facilities (Continued)

Recreation Area	Intersects ROW or Ancillary Facility	Potential Impact
Las Vegas Valley SRMA	Yes	• Detract from the natural character of the area and diminish the recreation experience • Proximity of ROWs to OHV trails may displace users
Loneliest Highway SRMA	Yes	• Detract from the natural character of the area and diminish the recreation experience
Nellis Dunes SRMA	No	• Construction activity nearby could affect recreational setting and views from the area
North Delamar SRMA	No	• Construction activity nearby could affect recreational setting and views from the area
OHV race routes	Yes	• Temporarily reduce public access to recreational trails, delay or interfere with racing events, and potentially displace users to other areas during construction
Pahranagat SRMA	No	• Construction activity nearby could affect recreational setting and views from the area
Pioche SRP	Yes	• Separation of the western-most 10 percent of SRP area from remainder of the SRP • Temporarily reduce public access to recreational trails, delay or interfere with racing events, and potentially displace users to other areas during construction
Silver State Off-highway Vehicle Trail Backcountry Byway	Yes	• Disturbance eliminating public access during construction periods (especially in Cave Valley), displacing users to other areas during construction • Construction ROW passing close to an existing trailhead for the Silver State Off-highway Vehicle Trail in the southern part may hinder access
Steptoe Valley WMA	Yes	• Potential disruption to recreational activities (i.e., hunting, fishing, bird watching, and other wildlife viewing) in the WMA
Sunrise Mountain SRMA	No	• Construction activity nearby could affect recreational setting and views from the area

The proposed construction support site would be adjacent to the Caliente access road to the Silver State Off-highway Vehicle Trail (on the south side of U.S. 93, west of Caliente). No improved trailhead exists at this location and the siting of the construction-support facility on private land would further reduce access to the Silver State Off-highway Vehicle Trail from the town of Caliente. Access to the Silver State Off-highway Vehicle Trail would be more than 0.5 mile further from Caliente than its current location. This distance would require the public to travel adjacent to the construction-support site on U.S. 93. In addition, visitors to Kershaw-Ryan State Park, accessed via SH 317, could encounter active construction traffic on SH 317 as well as U.S. 93 that could cause unanticipated delays to visitors.

The northeastern-most ROW and facility construction would be approximately 3 miles from GBNP and, therefore, recreation users in GBNP would not be directly affected by ROW construction.

Dispersed recreation use outside of these designated recreation areas also would occur. Construction of the ROW and ancillary facilities would have direct localized short-term adverse impacts to dispersed recreation resources, such as biking, camping, OHV use, and special events, in the immediate vicinity of construction activities. Noise, equipment, and activity associated with construction would disrupt remote recreational experiences; however, the likelihood of recreationists encountering construction activities would be minimal in most of the area given the amount of public lands open to recreation. Impacts would likely be greater near popular use areas and developed recreation sites. Long-

term adverse impacts to recreation would result from alteration of the recreation setting remaining after the completion of construction from remaining aboveground structures and vegetation alteration.

Applicant committed measures:

ACMs would minimize some of the construction impacts on recreation activities. ACMs relevant to recreation are listed below.

ACM A.1.4. In accordance with the Ely BLM RMP, SNWA will notify the BLM at least 10 days before initiation of the project. Notification will be made to the designated BLM representative as well as the BLM biologists in the Las Vegas, Caliente, and Ely BLM offices.

ACMs A.1.28 through A.1.32 include requirements for traffic management (such as signing, traffic controls, and detours) on access roads and would minimize adverse impacts to the public that uses those roads to access recreation areas.

ACM A.2.1. Facility inspection and maintenance will use established access roads, and no off-road travel will be allowed. While driving on paved roads or marked dirt roads, posted speed limits will be maintained. While driving on un-posted dirt roads, a maximum speed limit of 25 mph will be maintained to reduce dust and allow for observation of desert tortoise, livestock, wild horses, or other wildlife in the road.

ACM A.11.2 would limit adverse impacts on the night sky by limiting lighting for nighttime construction to the basic requirements to conduct the work and by shielding lights to direct down towards the site; not into surrounding areas or onto roads.

Proposed mitigation measures:

ROW-REC-1: Enforce Recreational OHV Travel Restrictions. (see Mitigation Measure ROW-T-1 under Transportation) Identify construction zone and construction vehicle access areas where restrictions to unauthorized OHV travel should be enforced. Effectiveness: This measure would be effective, since coordination with BLM would minimize impacts to environmental resources. Effects on other resources: Implementation of this measure would not affect other environmental resources.

ROW-REC-2: Avoid Recreational Use Conflicts with Construction Activities. SNWA ACM 1.28 notes that a Construction Traffic Management Plan would be developed that takes into account recreation activities. The plan should schedule construction activities (pipeline and aboveground ancillary facilities) to minimize conflicts with recreation activities such as race events, hunting, and elk viewing. Effectiveness: This measure would be effective, since coordination with BLM would minimize impacts on recreational users. Effects on other resources: Implementation of this measure would not affect other environmental resources.

ROW-REC-3: Avoid Recreational Trail Location Conflicts. SNWA would coordinate with the BLM regarding future trail use where SRMAs and SRP areas are crossed. Effectiveness: This measure would be effective, since coordination with BLM would minimize impacts on future recreational uses. Effects on other resources: Implementation of this measure would not affect other environmental resources.

Conclusion. Construction activities would directly affect the following recreation areas: Caliente SRP area (239 acres), Pioche SRP area (1,148 acres), Chief Mountain SRMA (178 acres), Las Vegas Valley SRMA (184 acres), Loneliest Highway SRMA (695 acres), and Steptoe Valley WMA (4 acres). The surface disturbance anticipated in the recreation areas would comprise <1 percent of any recreation area and impacts would be localized. Surface disturbance, noise, and sights and sounds of other people during construction in these areas would detract from the natural character of the area, including the recreation setting, and diminish the recreation experience in the short-term. Minimal long-term adverse impacts to recreation in these areas would result from alteration of the recreation setting in areas with aboveground structures and vegetation alteration. Any increase in traffic associated with operations and maintenance, even in remote areas of the ROW would likely be unnoticeable by recreationists in the area.

There may be delays in accessing developed and dispersed recreation areas due to construction, as well as potential disturbances to resources in recreation areas due to noise and construction on existing roads/trails. Access to both developed and dispersed recreation areas could be temporarily disturbed by delays in accessing these areas caused by construction activities. There also would be temporary disturbances to the recreational resources themselves (e.g., wildlife, wildlife habitat, recreational trails) during construction activities. This would be mitigated by proper coordination and timing of construction activities.

Residual impacts include:

- There would be a small amount of permanent surface disturbance in the following areas: Caliente SRP area (87 acres), Pioche SRP area (55 acres), Chief Mountain SRMA (42 acres), Las Vegas Valley SRMA (15 acres), and Loneliest Highway SRMA (58 acres). Long-term effects to recreation would result from alteration of the recreation setting remaining after the completion of construction from remaining aboveground structures and vegetation alteration.

Impacts on Hunting or Other Wildlife-Based Uses

Hunting and fishing are important recreational activities in the project area, as indicated by the number of hunting and fishing licenses sold (**Table 3.9-3**). The area's wildlife also attracts other wildlife-based recreation, including bird-watching and nature photography. Construction during hunting, fishing, or other active wildlife seasons could adversely affect these activities by creating additional noise, disrupting habitat that attracts wildlife and bird species, and increased human presence. Impacts on wildlife and fisheries are further discussed in Sections 3.6, Terrestrial Wildlife and 3.7, Aquatic Biological Resources.

Construction activities could temporarily alter or restrict access to areas used by hunters, fishermen, bird watchers, nature photographers, and other wildlife enthusiasts. Wildlife habitat changes caused by surface disturbance of vegetation (and subsequent revegetation) would have long-term impacts within the ROWs. Two streams with game fish (Snake and Steptoe creeks) would be crossed by the pipeline and power line ROWs.

The Steptoe Valley WMA, east of Ely, would be crossed by a proposed power line ROW. This crossing could cause minor disruptions in access to recreation (i.e., fishing, hunting, bird watching, and other wildlife viewing) during construction. The northeastern-most ROW and facility construction would be approximately 3 miles from GBNP and, therefore, impacts to dispersed and wildlife-based recreation in the Park would not be directly affected by ROW construction.

Applicant committed measures:

ACM A.1.4 (notification of BLM prior to project mitigation) and ACMs A.1.28 through A.1.32 (traffic management) would minimize construction impacts to hunting or other wildlife-based uses.

Proposed mitigation measures:

ROW-REC-1: Recreational OHV Travel Restrictions, **ROW-REC-2: Avoid Recreational Use Conflicts**, and **ROW-REC-3: Avoid Recreational Trail Conflicts**. These measures also would be applied to the issue involving reduced access to recreation areas or dispersed recreation for hunting or other wildlife-based uses.

Conclusion. Construction activities could temporarily alter or restrict access to areas for hunting or other wildlife-based uses. Wildlife habitat changes caused by surface disturbance of vegetation (and subsequent revegetation) would have long-term impacts within the ROWs. Two streams with game fish (Snake and Steptoe creeks) and one WMA (Steptoe Valley WMA) would be crossed by the pipeline and power line ROWs.

Residual impacts include:

- Access to both developed and dispersed recreation areas used for hunting or other wildlife-based uses could be temporarily disturbed by delays caused by construction. There also would be short-term disturbances to the

recreational resources themselves (e.g., wildlife, wildlife habitat, recreational trails, etc.) during construction activities. This would be mitigated by proper coordination and timing of construction activities.

Unauthorized Public Access and Route Proliferation

Improvement of existing primitive roads in conjunction with the project could result in indirect effects to recreation from route proliferation and unauthorized public use of the project ROWs. The public could use these improved roads to access previously inaccessible public lands or create new routes to destination areas, such as the Silver State Off-highway Vehicle Trail Backcountry Byway. OHV users on the Silver State Trail, due to its proximity to ROWs associated with the project, could make unauthorized use of the pipeline and power line ROWs. Impacts to recreation could include degradation of quality of recreational resources by a network of "social" roads, however, the degree of impacts cannot be estimated as the actual level and location of route proliferation is speculative at this time.

Applicant committed measures:

ACM A.1.4 (notification of BLM prior to project mitigation), ACMs A.1.28 through A.1.32 (traffic management), and ACM A.2.1 (limitations to inspection and maintenance travel) would minimize construction impacts to recreation activities.

Proposed mitigation measures:

ROW-REC-1: Recreational OHV Travel Restrictions. ROW-REC-1 would be applied to the issue involving route proliferation and unauthorized public use of the project ROWs.

Conclusion. Construction of ROWs and ancillary facilities and facility maintenance would result in route proliferation and unauthorized public use of the project ROWs that could degrade the quality of recreational resources.

Residual impacts include:

- While mitigation would reduce the extent of the impact, route proliferation and unauthorized public use of the project ROWs would likely occur to some extent in the project area.

3.9.2.3 Alternative D

Construction and Facility Maintenance

Reduced Access to Recreation Areas and Dispersed Recreation Activities

Table 3.9-6 provides a summary of temporary and permanent disturbance to ROWs within designated recreation areas. Surface disturbance, noise, and visual presence of other people during construction in these areas would detract from the natural character of the area and diminish the recreation experience on a short-term basis. While all recreation use types would be affected, impacts from construction intrusions would be greater for non-motorized based uses. Long-term adverse impacts to recreation in these areas would result from alteration of the recreation setting in areas with aboveground structures and vegetation alteration. Any increase in traffic associated with operations and maintenance, even in remote areas of the ROW, would likely be unnoticeable by recreationists in the area.

The surface disturbance that would occur in the recreation areas would comprise <1 percent of any recreation area and impacts would be localized. However, the ROW and ancillary facilities pass through the western-most edge of the Chief Mountain SRMA and Caliente SRP area and intersect the Pioche SRP area, which would separate the western-most 10 percent of the SRP area from the remaining 90 percent. Along with the multiple crossings of the Silver State Off-highway Vehicle Trail Backcountry Byway by construction activities in Delamar, Dry Lake, and Cave valleys, this division could temporarily reduce public access to recreational trails. Because these SRP areas are used for motorcycle and truck racing, the construction of the project ROWs could interfere with racing events. The Loneliest Highway SRMA and Steptoe Valley WMA would not be directly affected under this alternative.

Table 3.9-6 Summary of Potential Surface Disturbance in Recreation Areas from Construction of Rights-of-way and Ancillary Facilities, Alternative D

Recreation Area	Temporary Surface Disturbance in ROWs (Acres)	Permanent Surface Disturbance in ROWs (Acres)
Caliente SRP	239	87
Chief Mountain SRMA	178	42
Las Vegas Valley SRMA	184	15
Loneliest Highway SRMA	0	0
Pioche SRP	1,148	55
Steptoe Valley WMA	0	0
Total	**1,749**	**199**

Many of the proposed ROWs either cross or are within several OHV race routes commonly used for motorcycle or truck race events throughout the year. The OHV race routes occur throughout Cave, Delamar, Dry Lake, and Steptoe valleys. This overlap could limit or preclude the use of these routes during construction.

In addition to those areas that would be directly affected, several other recreation areas could experience indirect effects from the construction of the ROWs and ancillary facilities. Reduced access and reduced opportunities for dispersed recreation might occur in those designated recreation areas adjacent to but not intersected by the ROWs. Construction of ancillary facilities could reduce the quality of recreational experiences, displace recreation users to other areas, or eliminate some recreation opportunities in localized areas. These areas, and the potential effects from construction, are listed in **Table 3.9-7**.

The proposed construction support site would be adjacent to the Caliente access road to the Silver State Off-highway Vehicle Trail (on the south side of U.S. 93, west of Caliente). No improved trailhead exists at this location and the siting of the construction-support facility on private land would further reduce access to the Silver State Off-highway Vehicle Trail from the town of Caliente. Access to the Silver State Off-highway Vehicle Trail would be more than 0.5 mile further from Caliente than its current location. This distance would require the public to travel adjacent to the construction-support site on U.S. 93. In addition, visitors to Kershaw-Ryan State Park, accessed via SH 317, could encounter active construction traffic on SH 317 and U.S. 93, causing unanticipated delays to visitors.

Since construction in White Pine County would be excluded under this alternative, impacts to recreation areas in White Pine County including GBNP would not be anticipated.

Table 3.9-7 Evaluation of Potential Construction Impacts to Recreation Areas Near Rights-of-way and Ancillary Facilities, Alternative D

Recreation Area	Intersects ROW or Ancillary Facility	Potential Impact
Caliente SRP	Yes	• Temporarily reduce public access to recreational trails, delay or interfere with racing events, and potentially displace users to other areas during construction
Chief Mountain SRMA	Yes	• Temporarily reduce public access to recreational trails and potentially displace users to other areas during construction
Chief Mountain West Trailhead	No, but near trailhead	• Temporarily reduce public access to trailhead and adjacent trails • Diminished recreational experience because of a pipeline staging area within 0.25 mile of trailhead • Potentially displace users to other areas during construction

Table 3.9-7 Evaluation of Potential Construction Impacts to Recreation Areas Near Rights-of-way and Ancillary Facilities, Alternative D (Continued)

Recreation Area	Intersects ROW or Ancillary Facility	Potential Impact
Kershaw-Ryan State Park	No	• Potentially impaired access caused by active construction traffic on SH 317 as well as U.S. 93 to the construction-support site near Caliente that could cause unanticipated delays to visitors
Las Vegas Valley SRMA	Yes	• Detract from the natural character of the area and diminish the recreation experience • Proximity of ROWs to OHV trails may displace users
Nellis Dunes SRMA	No	• Construction activity nearby could affect recreational setting and views from the area
North Delamar SRMA	No	• Construction activity nearby could affect recreational setting and views from the area
OHV race routes (in Lincoln County)	Yes	• Temporarily reduce public access to recreational trails, delay or interfere with racing events, and potentially displace users to other areas during construction
Pahranagat SRMA	No	• Construction activity nearby could affect recreational setting and views from the area
Pioche SRP	Yes	• Separation of the western-most 10 percent of SRP area from remainder of the SRP • Temporarily reduce public access to recreational trails, delay or interfere with racing events, and potentially displace users to other areas during construction
Silver State Off-highway Vehicle Trail Backcountry Byway	Yes	• Disturbance eliminating public access during construction periods (especially in Cave Valley) , displacing users to other areas during construction • Construction ROW passing close to an existing trailhead for the Silver State Off-highway Vehicle Trail in the southern part may hinder access
Sunrise Mountain SRMA	No	• Construction activity nearby could affect recreational setting and views from the area

Dispersed recreation use outside of these designated recreation areas would also occur. Construction of the ROW and ancillary facilities would have direct localized short-term adverse impacts to dispersed recreation resources in the immediate vicinity of construction activities. Noise, equipment and activity associated with construction would disrupt remote recreational experiences; however, the likelihood of recreationists encountering construction activities would be minimal in most of the area given the amount of public lands open to recreation. Impacts would likely be greater near popular use areas and developed recreation sites. Long-term adverse impacts to recreation would result from alteration of the recreation setting remaining after the completion of construction from remaining aboveground structures and vegetation alteration.

Applicant committed measures:

ACM A.1.4 (notification of BLM prior to project mitigation), ACMs A.1.28 through A.1.32 (traffic management), ACM A.2.1 (limitations to inspection and maintenance travel), and ACM A.11.2 (impacts on the night sky) would minimize construction impacts to recreation activities.

Additional mitigation measures:

ROW-REC-1: Recreational OHV Travel Restrictions, **ROW-REC-2: Avoid Recreational Use Conflicts**, and **ROW-REC-3: Avoid Recreational Trail Conflicts**. These measures would minimize construction impacts to recreation activities.

Conclusion. Impacts to recreation users from construction activities would occur to a lesser extent than under the Proposed Action and Alternatives A through C, because the ROWs would not extend into White Pine County. Direct impacts from construction under this alternative would not occur to the Loneliest Highway SRMA and Steptoe Valley WMA. The surface disturbance anticipated in the recreation areas would comprise less than 0.3 percent of any recreation area and impacts would be localized. Surface disturbance, noise, and sights and sounds of other people during construction in the Caliente SRP area (239 acres), Pioche SRP area (1,148 acres), Chief Mountain SRMA (178 acres), and Las Vegas Valley SRMA (184 acres) would detract from the natural character of the area and diminish the recreation experience in the short-term. Minimal long-term adverse impacts to recreation in these areas would result from alteration of the recreation setting in areas with aboveground structures and vegetation alteration. Any increase in traffic associated with operations and maintenance, even in remote areas of the ROW would likely be unnoticeable by recreationists in the area.

There may be delays in accessing developed and dispersed recreation areas due to construction, as well as potential disturbances to resources in recreation areas due to noise and construction on existing roads/trails. There also would be temporary disturbances to the recreational resources themselves (e.g., wildlife, wildlife habitat, recreational trails) during construction activities. This would be mitigated by proper coordination and timing of construction activities.

Residual impacts include:

- A small amount of permanent surface disturbance would occur in the following areas: Caliente SRP area (87 acres), Pioche SRP area (55 acres), Chief Mountain SRMA (42 acres), and Las Vegas Valley SRMA (15 acres). Long-term adverse impacts to recreation would result from alteration of the recreation setting remaining after the completion of construction from remaining aboveground structures and vegetation alteration.

Impacts on Hunting or Other Wildlife-Based Uses

Hunting and fishing are important recreational activities in the project area, as indicated by the number of hunting and fishing licenses sold (**Table 3.9-3**). The area's wildlife also attracts other wildlife-based recreation, including bird-watching and nature photography. Construction during hunting or other active wildlife seasons could adversely affect these activities by creating additional noise, disrupting habitat that attracts wildlife and bird species, and increased human presence. Impacts on wildlife and fisheries are further discussed in Section 3.6, Terrestrial Wildlife and 3.7, Aquatic Biological Resources.

Construction activities could temporarily alter or restrict access to areas used by hunters, bird watchers, nature photographers, and other wildlife enthusiasts. Wildlife habitat changes caused by surface disturbance of vegetation (and subsequent revegetation) would have long-term impacts within the ROWs. There would be no effect on recreational fishing under Alternative D because no streams with game fisheries would be crossed by ROWs. No direct or indirect impacts to the Steptoe Valley WMA, GBNP, or other recreation areas in White Pine County would be anticipated under this alternative.

Applicant committed measures:

ACM A.1.4 (notification of BLM prior to project mitigation), ACMs A.1.28 through A.1.32 (traffic management), and ACM A.2.1 (limitations to inspection and maintenance travel) would minimize construction impacts to hunting or other wildlife-based uses.

Proposed mitigation measures:

ROW-REC-1: Recreational OHV Travel Restrictions, **ROW-REC-2: Avoid Recreational Use Conflicts**, and **ROW-REC-3: Avoid Recreational Trail Conflicts**. These measures also would be applied to the issue involving reduced access to recreation areas or dispersed recreation for hunting or other wildlife-based uses.

Conclusion. Construction activities could temporarily alter or restrict access to areas for hunting or other wildlife-based uses. Wildlife habitat changes caused by surface disturbance of vegetation (and subsequent revegetation) would have long-term impacts within the ROWs. There would be no effect on recreational fishing under Alternative D because no streams with game fisheries would be crossed by ROWs. No direct or indirect impacts to the Steptoe Valley WMA, GBNP, or other recreation areas in White Pine County would be anticipated under this alternative.

Residual impacts include:

- Access to both developed and dispersed recreation used for hunting or other wildlife-based uses could be temporarily disturbed by delays caused by construction. There would also be short-term disturbances to the recreational resources themselves (e.g., wildlife, wildlife habitat, recreational trails) during construction activities. This would be mitigated by proper coordination and timing of construction activities.

Unauthorized Public Access and Route Proliferation

Improvement of existing primitive roads in conjunction with the project could result in indirect effects to recreation from route proliferation and unauthorized public use of the project ROWs. The public could use these improved roads to access previously inaccessible public lands or create new routes to destination areas, such as the Silver State Off-highway Vehicle Trail Backcountry Byway. OHV users on the Silver State Trail, due to its proximity to ROWs associated with the project, could make unauthorized use of the pipeline and power line ROWs. Impacts to recreation could include degradation of quality of recreational resources by a network of "social" roads, however, the degree of impacts cannot be estimated as the actual level and location of route proliferation is speculative at this time.

Applicant committed measures:

ACM A.1.4 (notification of BLM prior to project mitigation), ACMs A.1.28 through A.1.32 (traffic management), and ACM A.2.1 (limitations to inspection and maintenance travel) would minimize construction impacts to recreation activities.

Proposed mitigation measures:

ROW-REC-1: Recreational OHV Travel Restrictions. ROW-REC-1would be applied to the issue involving route proliferation and unauthorized public use of the project ROWs.

Conclusion. Construction of ROWs and ancillary facilities and facility maintenance would result in route proliferation and unauthorized public use of the project ROWs that could degrade the quality of recreational resources.

Residual impacts include:

- Route proliferation and unauthorized public use of the project ROWs to the extent not reduced by mitigation.

3.9.2.4 Alternatives E and F

Construction and Facility Maintenance

Reduced Access to Recreation Areas and Dispersed Recreation Activities

Table 3.9-8 provides a summary of temporary and permanent disturbance to ROWs within designated recreation areas. Surface disturbance, noise, and visual presence of other people during construction in these areas would detract from the natural character of the area and diminish the recreation experience on a short-term basis. While all recreation use types would be affected, impacts from construction intrusions would be greater for non-motorized based uses. Long-term adverse impacts to recreation in these areas would result from alteration of the recreation setting in areas with aboveground structures and vegetation alteration. Any increase in traffic associated with operations and maintenance, even in remote areas of the ROW, would likely be unnoticeable by recreationists in the area.

The surface disturbance that would occur in the recreation areas would comprise <1 percent of any recreation area and impacts would be localized. However, the ROW and ancillary facilities pass through the western-most edge the Chief Mountain SRMA and Caliente SRP area and intersect the Pioche SRP area, which would separate the western-most 10 percent of the SRP area from the remaining 90 percent. Along with the multiple crossings of the Silver State Off-highway Vehicle Trail Backcountry Byway by construction activities in Delamar, Dry Lake, and Cave valleys, this division could temporarily reduce public access to recreational trails. Because these SRP areas are used for motorcycle and truck racing, the construction of the project ROWs could interfere with racing events. Where the corridor passes through the Steptoe Valley WMA, the proposed power line would be within an existing designated utility corridor.

While the recreation setting in this area would be altered in this area, the power line would be compatible with approved management direction.

Table 3.9-8 Summary of Potential Surface Disturbance in Recreation Areas from Construction of Rights-of-way and Ancillary Facilities, Alternatives E and F

Recreation Area	Temporary Surface Disturbance in ROWs (Acres)	Permanent Surface Disturbance in ROWs (Acres)
Calicnte SRP	239	87
Chief Mountain SRMA	178	42
Las Vegas Valley SRMA	184	15
Loneliest Highway SRMA	695	58
Pioche SRP	1,148	55
Steptoe Vallcy WMA	4	0
Total	**2,448**	**257**

Many of the proposed ROWs either cross or are within several motorcycle or truck race routes used throughout the year. The OHV race routes occur throughout Cave, Delamar, Dry Lake, and Steptoe valleys. This overlap could limit or preclude the use of these routes during construction.

In addition to those areas that would be directly affected, several other recreation areas could experience indirect effects from the construction of the ROWs and ancillary facilities. Reduced access and reduced opportunities for dispersed recreation might occur in those designated recreation areas that are adjacent to but not intersected by the ROWs. Construction of ancillary facilities could reduce the quality of recreational experiences, displace recreation users to other areas, or eliminate some recreation opportunities in localized areas. These areas, and the potential effects from construction, are listed in **Table 3.9-9**.

Table 3.9-9 Evaluation of Potential Construction Impacts to Recreation Areas Near Rights-of-way and Ancillary Facilities, Alternatives E and F

Recreation Area	Intersects ROW or Ancillary Facility	Potential Impact
Caliente SRP	Yes	• Temporarily reduce public access to recreational trails, delay or interfere with racing events, and potentially displace users to other arcas during construction
Cave Lake State Park	No	• Additional construction traffic may hinder access on SH 486 • Additional lighting and construction activity could affect nearby recreational setting and views from the area
Chief Mountain SRMA	Yes	• Temporarily reducc public access to recreational trails and potentially displace users to other areas during construction
Chief Mountain West Trailhead	No, but near trailhead	• Temporarily reduce public access to trailhead and adjacent trails • Diminished recreational experience because of a pipeline staging area within 0.25 milc of trailhead • Potentially displace users to other areas during construction
Ely Elk Viewing Area	No	• Disturbance to elk during construction could reduce opportunities for elk viewing
Kershaw-Ryan State Park	No	• Potentially impaired access caused by active construction traffic on SH 317 and U.S. 93 to the construction-support site near Caliente; causing unanticipated delays to visitors

Table 3.9-9 Evaluation of Potential Construction Impacts to Recreation Areas Near Rights-of-way and Ancillary Facilities, Alternatives E and F (Continued)

Recreation Area	Intersects ROW or Ancillary Facility	Potential Impact
Las Vegas Valley SRMA	Yes	• Detract from the natural character of the area and diminish the recreation experience • Proximity of ROWs to OHV trails may displace users
Loneliest Highway SRMA	Yes	• Detract from the natural character of the area and diminish the recreation experience
Nellis Dunes SRMA	No	• Construction activity nearby could affect recreational setting and views from the area
North Delamar SRMA	No	• Construction activity nearby could affect recreational setting and views from the area
OHV race routes	Yes	• Temporarily reduce public access to recreational trails, delay or interfere with racing events, and potentially displace users to other areas during construction
Pahranagat SRMA	No	• Construction activity nearby could affect recreational setting and views from the area
Pioche SRP	Yes	• Separation of the western-most 10 percent of SRP area from the remainder of the SRP • Temporarily reduce public access to recreational trails, delay or interfere with racing events, and potentially displace users to other areas during construction
Silver State Off-highway Vehicle Trail Backcountry Byway	Yes	• Disturbance eliminating public access during construction periods (especially in Cave Valley), displacing users to other areas during construction • Construction ROW passing close to an existing trailhead for the Silver State Off-highway Vehicle Trail in the southern part may hinder access
Steptoe Valley WMA	Yes	• Potential disruption to recreational activities (i.e., hunting, fishing, bird watching, and other wildlife viewing) in the WMA
Sunrise Mountain SRMA	No	• Construction activity nearby could affect recreational setting and views from the area

The proposed construction support site would be adjacent to the Caliente access road to the Silver State Off-highway Vehicle Trail (on the south side of U.S. 93, west of Caliente). No improved trailhead exists at this location and the siting of the construction-support facility on private land would further reduce access to the Silver State Off-highway Vehicle Trail from the town of Caliente. Access to the Silver State Off-highway Vehicle Trail would be more than 0.5 mile further from Caliente than its current location. This distance would require the public to travel adjacent to the construction-support site on U.S. 93. In addition, visitors to Kershaw-Ryan State Park, accessed via SH 317, could encounter active construction traffic on SH 317 and U.S. 93; causing unanticipated delays to visitors.

The northeastern-most ROW and facility construction would be located further from GBNP than the Proposed Action. As stated for the Proposed Action, indirect effects of construction on GBNP would not occur.

Dispersed recreation use outside of these designated recreation areas would also occur. Construction of the ROW and ancillary facilities would have direct localized short-term adverse impacts to dispersed recreation resources in the immediate vicinity of construction activities. Noise, equipment, and activity associated with construction would disrupt remote recreational experiences; however, the likelihood of recreationists encountering construction activities would be minimal in most of the area given the amount of public lands open to recreation. Impacts would be greater near popular use areas and developed recreation sites. Long-term adverse impacts to recreation would result from alteration of the

recreation setting remaining after the completion of construction from remaining aboveground structures and vegetation alteration. Alternatives E and F would not directly impact dispersed recreation in Snake Valley.

Applicant committed measures:

ACM A.1.4 (notification of BLM prior to project mitigation), ACMs A.1.28 through A.1.32 (traffic management), ACM A.2.1 (limitations to inspection and maintenance travel), and ACM A.11.2 (impacts to night sky) would minimize construction impacts to recreation activities.

Proposed mitigation measures:

ROW-REC-1: Recreational OHV Travel Restrictions, **ROW-REC-2: Avoid Recreational Use Conflicts**, and **ROW-REC-3: Avoid Recreational Trail Conflicts**. These measures also would be applied to the issue involving access to recreation areas.

Conclusion. Construction activities impact recreational activities to a lesser extent than under the Proposed Action and Alternatives A through C and a slightly greater extent than Alternative D, due to the fact that the ROWs would not be extended into Snake Valley. Construction activities would directly affect the following recreation areas: Caliente SRP area (239 acres), Pioche SRP area (1,148 acres), Chief Mountain SRMA (178 acres), Las Vegas Valley SRMA (184 acres), Loneliest Highway SRMA (695 acres), and Steptoe Valley WMA (4 acres). The surface disturbance anticipated in the recreation areas would comprise less than 0.3 percent of any recreation area and impacts would be localized. Surface disturbance, noise, and sights and sounds of other people during construction in these areas would detract from the natural character of the area and diminish the recreation experience in the short-term. Minimal long-term adverse impacts to recreation in these areas would result from alteration of the recreation setting in areas with aboveground structures and vegetation alteration. Any increase in traffic associated with operations and maintenance, even in remote areas of the ROW would likely be unnoticeable by recreationists in the area.

There may be delays in accessing developed and dispersed recreation areas due to construction, as well as potential disturbances to resources in recreation areas due to noise and construction on existing roads/trails. There also would be temporary disturbances to the recreational resources (e.g., wildlife, wildlife habitat, recreational trails) during construction activities. This would be mitigated by proper coordination and timing of construction activities.

Residual impacts include:

- A small amount of permanent surface disturbance would occur in the following areas: Caliente SRP area (87 acres), Pioche SRP area (55 acres), Chief Mountain SRMA (42 acres), Las Vegas Valley SRMA (15 acres), and Loneliest Highway SRMA (58 acres). Long-term adverse impacts to recreation would result from alteration of the recreation setting remaining after the completion of construction from remaining aboveground structures and vegetation alteration. There would be no direct impacts to recreation areas and dispersed recreation in Snake Valley.

Impacts on Hunting or Other Wildlife-Based Uses

Hunting and fishing are important recreational activities in the project area, as indicated by the number of hunting and fishing licenses sold (**Table 3.9-3**). The area's wildlife also attracts other wildlife-based recreation, including bird-watching and nature photography. Construction during hunting or other active wildlife seasons also could adversely affect these activities, by creating additional noise, disrupting habitat that attracts wildlife and bird species, and increased human presence. Impacts on wildlife and fisheries are further discussed in Sections 3.6, Terrestrial Wildlife and 3.7, Aquatic Biological Resources.

Construction activities could temporarily alter or restrict access to areas used by hunters, bird watchers, nature photographers, and other wildlife enthusiasts. Wildlife habitat changes caused by surface disturbance of vegetation (and subsequent revegetation) would have long-term impacts within the ROWs. There would be no effect on recreational fishing under Alternatives E and F because no streams with game fisheries would be crossed by ROWs.

The Steptoe Valley WMA, east of Ely, would be crossed by a proposed power line ROW. This crossing could cause minor disruptions in access to recreation (i.e., fishing, hunting, bird watching, and other wildlife viewing) during construction. The northeastern-most ROW and facility construction would be further from GBNP than the Proposed Action and, therefore, impacts to dispersed and wildlife-based recreation in GBNP would not be directly affected by ROW construction.

Applicant committed measures:

ACM A.1.4 (notification of BLM prior to project mitigation) and ACMs A.1.28 through A.1.32 (traffic management) would minimize construction impacts to hunting or other wildlife-based uses.

Proposed mitigation measures:

ROW-REC-1: Recreational OHV Travel Restrictions, **ROW-REC-2: Avoid Recreational Use Conflicts**, and **ROW-REC-3: Avoid Recreational Trail Conflicts**. These measures also would be applied to the issue involving reduced access to recreation areas or dispersed recreation for hunting or other wildlife-based uses.

Conclusion. Construction activities could temporarily alter or restrict access to areas for hunting or other wildlife-based uses. Wildlife habitat changes caused by surface disturbance of vegetation (and subsequent revegetation) would have long-term impacts within the ROWs. There would be no effect on recreational fishing under Alternatives E and F because no streams with game fisheries would be crossed by ROWs.

Residual impacts include:

- Access to both developed and dispersed recreation areas used for hunting or other wildlife-based uses could be temporarily disturbed by delays caused by construction. There also would be temporary disturbances to the recreational resources themselves (e.g., wildlife, wildlife habitat, recreational trails, etc.) during construction activities. This would be mitigated by proper coordination and timing of construction activities.

Unauthorized Public Access and Route Proliferation

Improvement of existing primitive roads in conjunction with the project could result in indirect effects to recreation from route proliferation and unauthorized public use of the project ROWs. The public could use these improved roads to access previously inaccessible public lands or create new routes to destination areas, such as the Silver State Off-highway Vehicle Trail Backcountry Byway. OHV users on the Silver State Trail, due to its proximity to ROWs associated with the project, could make unauthorized use of the pipeline and power line ROWs. Impacts to recreation could include degradation of quality of recreational resources by a network of "social" roads, however, the degree of impacts cannot be estimated as the actual level and location of route proliferation is speculative at this time.

Applicant committed measures:

ACM A.1.4 (notification of BLM prior to project mitigation), ACMs A.1.28 through A.1.32 (traffic management), and ACM A.2.1 (limitations to inspection and maintenance travel) would minimize construction impacts to recreation activities.

Proposed mitigation measures:

ROW-REC-1: Recreational OHV Travel Restrictions. ROW-REC-1 would be applied to the issue involving route proliferation and unauthorized public use of the project ROWs.

Conclusion. Construction of ROWs and ancillary facilities and facility maintenance would result in route proliferation and unauthorized public use of the project ROWs that could degrade the quality of recreational resources.

Residual impacts include:

- While mitigation would reduce the extent of the impact, route proliferation and unauthorized public use of the project ROWs would likely occur to some extent in the project area.

3.9.2.5 Alignment Options 1 through 4

Impacts for the Alignment Options (1 through 4) are identified in relation to the relevant segment of the Proposed Action and Alternatives A through C (**Table 3.9-10**).

Table 3.9-10 Recreation Impact Summary for Alignment Options 1 through 4

Alignment Option 1 (Humboldt-Toiybe Power Line Alignment) **Option Description**: Change the locations of a portion of the 230-kV power line from Gonder Substation near Ely to Spring Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Impacts associated with Alignment Option 1 include a reduction in temporary disturbance (43 percent less) in the Loneliest Highway SRMA, compared to the Proposed Action.
Alignment Option 2 (North Lake Valley Pipelinc Alignment) **Option Description**: Change the locations of portions of the mainline pipeline and electrical transmission line in North Lake Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Impacts associated with the Alignment Option 2 would similar to the Proposed Action.
Alignment Option 3 (Muleshoe Substation and Power Line Alignment) **Option Description**: Eliminate the Gonder to Spring Valley transmission line, and construct a substation with an interconnection with an interstate, high voltage power line in Muleshole Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Impacts associated with Alignment Option 3 include a reduction in temporary disturbance (47 percent less) in the Loneliest Highway SRMA, compared to the Proposed Action.
Alignment Option 4 (North Delamar Valley Pipeline and Power Line Alignment) **Option Description**: Change the location of a short section of mainline pipeline in Delamar Valley to follow an existing transmission line. **Applicable To**: All alternatives.	• Impacts associated with Alignment Option 4 include 6 percent more surface disturbance in the Caliente SRP area and 12 percent more surface disturbance in the Chief Mountain SRMA, compared to the Proposed Action.

3.9.2.6 No Action Alternative

Under the No Action Alternative, project construction and operation would be limited to that is already approved. The majority of the surface-disturbing activities to construct pipelines would occur on non-recreational public lands in Lincoln and Clark Counties. The use of recreation lands managed by other federal and state agencies would be handled in compliance with specific, existing management plans and guidelines. No changes to recreation would be expected.

3.9.2.7 Comparison of Alternatives

Table 3.9-11 compares the impacts to recreation from ROWs under the Proposed Action and Alternatives A through C plus Alternatives D, E, and F.

Table 3.9-11 Comparison of Alternatives

Parameter	Proposed Action and Alternatives A through C	Alternative D	Alternatives E and F
Long-term, direct impacts to recreation areas	6 recreation areas, 257 acres	4 recreation areas, 199 acres	6 recreation areas, 257 acres
Indirect impacts to recreation areas	16 recreation areas	12 recreation areas, no impacts in White Pine County	16 recreation areas, reduced impacts in Snake Valley
Impacts to dispersed recreation activities	Minimal, localized impacts to remote recreational experiences	Minimal, localized impacts to remote recreational experiences, except White Pine County	Minimal, localized impacts to remote recreational experiences, except Snake Valley
Impacts on Hunting or Other Wildlife-Based Uses	Two streams with game fish and one WMA would be crossed by the pipeline and power line ROWs	No direct impacts to streams with game fish or WMAs	No streams with game fish and one WMA would be crossed by the pipeline and power line ROWs
Unauthorized public access and route proliferation	Increased potential for route proliferation and unauthorized public use of the project ROWs	Increased potential for route proliferation and unauthorized public use of the project ROWs	Increased potential for route proliferation and unauthorized public use of the project ROWs

3.9.2.8 Groundwater Development and Groundwater Pumping

Issues

Groundwater Development Construction and Facility Maintenance

- Effects on recreation areas (e.g., SRMAs, Silver State Off-highway Vehicle Trail, National Parks) and dispersed recreation activities (e.g., biking, camping, OHV use, special events).
- Increased proliferation of OHV routes and unauthorized OHV use on ROWs.
- Conflicts with hunting or wildlife-based recreation on public and private lands.

Groundwater Pumping

- Groundwater drawdown effects on recreation setting and water-based activities.

Assumptions

Groundwater Development Construction and Facility Maintenance

- Construction activities within groundwater development areas would influence popular dispersed recreation activities in the region and hinder access to popular recreation areas.
- BLM management prescriptions and guidance would be followed.

Groundwater Pumping

- Alterations to vegetation and wildlife habitat caused by groundwater pumping would influence the recreation experience and visitors to National Parks.
- Groundwater drawdown that affects surface water resources would affect the recreation setting and water-based recreation activities.
- Assumptions about the potential changes in future groundwater availability from groundwater pumping do not incorporate additional assumptions about the effects of climate change because specific long term effects of climate change are not presently known, and the incremental contribution of climate change effects to project effects cannot be reasonably estimated. A general discussion of climate change effects is provided in Section 3.9.3.1, Cumulative Impacts Common to All Alternatives.

Methodology for Analysis

Groundwater Development Construction and Facility Maintenance

- Quantification of recreation areas and trails that would be crossed by the ROWs and ancillary facilities.
- Qualitative identification of overlap and potential conflicts between recreational seasons and construction activities.
- Identification of areas in which ROWs would be accessible by existing OHV trails.
- Identification of recreation sites within 5 miles of groundwater development areas, as well as other recreation areas that might have limited accessibility because of project construction and operation.
- Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

Groundwater Pumping

- Identification of water sources in recreation areas within the groundwater drawdown areas and an estimation of potential changes to water availability for these resources.

3.9.2.9 Proposed Action

Groundwater Development Area

Impacts to Recreation Areas and Dispersed Recreation Activities

Impacts from the construction of the well fields and associated facilities would be similar to those described for the construction and operation of the ROWs and ancillary facilities. As shown in **Table 3.9-12**, the Caliente and Pioche SRP areas and the Chief Mountain, Loneliest Highway, and North Delamar SRMAs all fall within the boundaries of proposed groundwater development areas. Surface disturbance, noise, and visual presence of other people during construction in these areas would detract from the natural character of the area and diminish the recreation experience in the short-term. While all recreation use types would be affected, impacts from construction intrusions would be greater for non-motorized based uses. Long-term adverse impacts to dispersed recreation use in these areas would result from alteration of the recreation setting in areas with aboveground structures and vegetation alteration. Any increase in traffic associated with operations and maintenance, even in remote areas of the ROW, would likely be unnoticeable by recreationists in the area.

Table 3.9-12 Recreation Areas Within Groundwater Development Areas

Recreation Area	Acres in Groundwater Development Areas	Percent of Recreation Area
Caliente SRP	1,895	0.4
Pioche SRP	58,355	14.5
Chief Mountain SRMA	2,409	2.2
Loneliest Highway SRMA	95,871	17.5
North Delamar SRMA	9,351	4.7

Although locations and amounts of surface disturbance within the groundwater development areas is unknown at this time, surface disturbance would be anticipated in only a small portion of the recreation areas. Impacts in these areas would be localized. Only 2 recreation areas have more than 10 percent of their total area contained within the groundwater development areas; the remaining three areas have less than 5 percent of their total area contained within the groundwater development areas.

In addition, the Silver State Off-highway Vehicle Trail Backcountry Byway crosses the groundwater development areas in Delamar, Dry Lake, and Cave valleys. Construction activities could reduce public access to recreational trails and alter the recreation setting for trail users in localized areas. Several OHV race routes commonly used for motorcycle or truck race events throughout the year also cross the areas identified for groundwater development. The OHV race routes occur throughout Delamar, Dry Lake, and Cave valleys. This overlap could limit or preclude the use of these routes during construction.

Impacts to dispersed recreation use outside of these designated recreation areas also would occur. Construction of the ROWs and ancillary facilities would have direct localized short-term adverse impacts to dispersed recreation resources in the immediate vicinity of construction activities. Noise, equipment, and activity associated with construction would disrupt remote recreational experiences; however, the likelihood of recreationists encountering construction activities would be minimal in most of the area given the amount of public lands open to recreation. Impacts would be greater near popular use areas and developed recreation sites. Impacts to dispersed recreation use would be anticipated to be higher in the southern portions of the project area, which receives more recreation use due to its proximity to Las Vegas, than the northern portions of the project area. Long-term adverse impacts to recreation would result from alteration of the recreation setting remaining after the completion of construction from remaining aboveground structures and vegetation alteration.

Applicant committed measures:

ACM A.1.4 (notification of BLM prior to project mitigation), ACMs A.1.28 through A.1.32 (traffic management), ACM A.2.1 (travel restrictions), and ACM A.11.2 (impacts on night sky) would minimize construction impacts on recreation activities.

Conclusion. Construction activities would directly affect the following recreation areas: Caliente SRP, Pioche SRP, Chief Mountain SRMA, Loneliest Highway SRMA, and North Delamar SRMA. Only 2 recreation areas have more than 10 percent of their total area contained within the groundwater development areas; the remaining three areas have less than 5 percent of their total area contained within the groundwater development areas. Surface disturbance would be anticipated only in a small portion of the recreation areas. Impacts in these areas would be localized. Surface disturbance, noise, and visual presence of other people during construction in these areas would detract from the natural character of the area and diminish the recreation experience in the short-term. Minimal long-term adverse impacts to dispersed recreation use in these areas would result from alteration of the recreation setting in areas with aboveground structures and vegetation alteration. Any increase in traffic associated with operations and maintenance, even in remote areas of the ROW would likely be unnoticeable by recreationists in the area.

There may be delays in accessing developed and dispersed recreation areas due to construction, as well as potential disturbances to resources in recreation areas due to noise, and construction on existing roads/trails. Impacts to dispersed recreation use would be anticipated at a higher level in the southern portions of the project area, which receives more recreation use due to its proximity to Las Vegas compared to the northern portions of the project area. There also would be temporary disturbances to the recreational resources (e.g., wildlife, vegetation, recreational trails, etc.) during construction activities. These impacts would be mitigated by proper coordination and timing of construction activities.

Proposed mitigation measures:

ROW-REC-1: Recreational OHV Travel Restrictions, **ROW-REC-2: Avoid Recreational Use Conflicts**, and **ROW-REC-3: Avoid Recreational Trail Conflicts**. These measures also would be applied to reduce impacts to recreation activities within groundwater development areas.

Potential residual impacts include:

- There would be a small amount of permanent surface disturbance in the following areas: Caliente SRP, Pioche SRP, Chief Mountain SRMA, Loneliest Highway SRMA, and North Delamar SRMA. Long-term adverse impacts to recreation would result from alteration of the recreation setting remaining after the completion of construction from remaining above-ground structures and vegetation alteration.

Impacts on Hunting or Other Wildlife-Based Uses

Hunting and fishing are important recreational activities in the project area, as indicated by the number of hunting and fishing licenses sold (**Table 3.9-3**). The area's wildlife also attracts other wildlife-based recreation, including bird-watching and nature photography. Construction during hunting, typical fishing, or other active wildlife seasons could adversely affect these activities by creating additional noise, disrupting habitat that attracts wildlife and bird species, and increased human presence. Impacts on wildlife and fisheries are further discussed in Sections 3.6, Terrestrial Wildlife and 3.7, Aquatic Biological Resources.

Construction activities could temporarily alter or restrict access to areas used by hunters, fishermen, bird watchers, nature photographers, and other wildlife enthusiasts. Removal and alteration of vegetation along the ROWs would modify the recreation setting for these users in the long-term. Long-term maintenance would be occasional and would only periodically affect recreation users.

Applicant committed measures:

ACM A.1.4 (notification of BLM prior to project mitigation) and ACMs A.1.28 through A.1.32 (traffic management) would minimize construction impacts to hunting or other wildlife-based uses.

Conclusion. Construction activities could temporarily alter or restrict access to areas for hunting or other wildlife-based uses. Removal and alteration of vegetation within the ROWs would modify the recreation setting for these users in the long-term. Long-term maintenance would be occasional and would only periodically affect recreation users when the activities occur.

Proposed mitigation measures:

ROW-REC-1: Recreational OHV Travel Restrictions, **ROW-REC-2: Avoid Recreational Use Conflicts**, and **ROW-REC-3: Avoid Recreational Trail Conflicts**. These measures would be applied to the issue involving reduced access to recreation areas or dispersed recreation for hunting or other wildlife-based uses.

Potential residual impacts include:

- Access to both developed and dispersed recreation areas used for hunting or other wildlife-based uses could be temporarily disturbed by delays caused by construction. There also would be short-term disturbances to the recreational resources themselves (e.g., wildlife, wildlife habitat, recreational trails) during construction activities. This would be mitigated by proper coordination and timing of construction activities. Removal and alteration of vegetation along the ROWs would modify the recreation setting for these users in the long-term. Long-term maintenance would be occasional and would only periodically affect recreation users when the activities occur.

Unauthorized Public Access and Route Proliferation

Improvement of existing primitive roads in conjunction with the project could result in indirect effects to recreation resources from route proliferation and unauthorized public use of the project ROWs. The public could use these improved roads and maintained ROWs to access previously inaccessible public lands or create new routes to destination areas, such as the Silver State Off-highway Vehicle Trail Backcountry Byway. OHV users on the Silver State Trail, due to its proximity to the groundwater development areas, could make unauthorized use of the access roads and ROWs. Impacts to recreation could include degradation of quality of recreational resources by a network of "social" roads, however, the degree of impacts cannot be estimated as the actual level and location of route proliferation is speculative at this time.

Applicant committed measures:

ACM A.1.4 (notification of BLM prior to project mitigation), ACMs A.1.28 through A.1.32 (traffic management), and ACM A.2.1 (limitations to inspection and maintenance travel) would minimize construction impacts to recreation activities.

Conclusion. Construction of the groundwater development areas would result in route proliferation and unauthorized public use of the project access roads and ROWs that could degrade the quality of recreational resources.

Proposed mitigation measures:

ROW-REC-1: Recreational OHV Travel Restrictions. ROW-REC-1would be applied to the issue involving route proliferation and unauthorized public use of the project ROWs.

Potential residual impacts include:

- While mitigation would reduce the extent of the impact, route proliferation and unauthorized public use of the project ROWs would likely occur to some extent in the project area.

Groundwater Pumping

Drawdown effects may reduce water levels in ponds, springs, and perennial streams and alter vegetation, which could change the recreation setting and wildlife use patterns and subsequently affect wildlife-based recreation including hunting, wildlife viewing, bird watching, and fishing. More details on the anticipated changes in overall plant communities and wildlife habitat are provided in Sections 3.5, Vegetation Resources and 3.6, Terrestrial Wildlife Resources. Section 3.7, Aquatic Biological Resources, provides more information related to impacts to aquatic species, such as recreational game fisheries.

The drawdown effects to water-based recreation were analyzed in terms of springs and streams that have a moderate to high risk of being affected by the drawdown due to their geomorphological setting (valley floor or valley margins, as

opposed to upland) and depth to groundwater (Section 3.3, Water Resources). Recreation areas with perennial streams at moderate to high risk of being affected by a 10-foot or greater drawdown under the Proposed Action include the Loneliest Highway SRMA at full build out, GBNP at full build out plus 75 years, and the Pioche SRP Area at full build out plus 200 years. The Loneliest Highway SRMA would have the most springs affected by the drawdown. Springs at moderate to high risk for reduced flows within recreation areas due to pumping effects are listed in **Table 3.9-13**. Recreation areas with perennial streams at moderate to high risk of being affected by a 10-foot or greater drawdown under the Proposed Action include GBNP and the Loneliest Highway SRMA at full build out plus 75 years and full build out plus 200 years, and the North Delamar SRMA at full build out plus 200 years. Perennial streams at moderate to high risk for reduced flows within recreation areas due to pumping effects are listed in **Table 3.9-14**. The potential risk to water resources within and adjacent to GBNP are addressed within Section 3.3, Water Resources.

The NPS has noted that the statute that established the GBNP specifies that the purpose of the GBNP is to conserve the natural resources within the GBNP and provide for the enjoyment of those resources in a way that leaves them unimpaired for future generations. NPS states that this mandate requires that there can be no impact to GBNP resources from the proposed project.

Recreational opportunities that could be affected if surface water resources are impacted by pumping include fishing and bird watching. Silver Creek Reservoir and Pruess Lake are fishable water bodies that also occur in the area of potential effects that could be adversely affected by groundwater drawdown. Reduced stream flows are likely to result in fewer sport fishing opportunities in these recreation areas if fisheries are diminished. The potential effects of the Proposed Action pumping on game fish streams within the entire project study area are discussed in Section 3.7, Aquatic Biological Resources.

Table 3.9-13 Number of Springs in Recreation Areas at Risk of Being Affected By Drawdown Due to Proposed Action Pumping

Recreation Areas	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Great Basin National Park	0	2	3
Loneliest Highway SRMA	2	18	19
Pioche SRP	0	0	1

Table 3.9-14 Miles of Perennial Streams in Recreation Areas at Risk of Being Affected By Drawdown Due to Proposed Action Pumping

Recreation Areas	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Cave Lake State Park	0	0	0
Great Basin National Park	0	6.3	9.6
Loneliest Highway SRMA	0	1.4	3.7
North Delamar SRMA	0	0	3

Applicant committed measures:

ACM – SNWA has recognized and agreed to "avoid any effect on federal resources within the boundaries of the GBNP from groundwater withdrawal by SNWA" (**Appendix C**).

Conclusion. Groundwater drawdown is projected to be greater than 10 feet for some springs and perennial streams in GBNP, Loneliest Highway SRMA, Pioche SRP area, and North Delamar SRMA. This could result in localized effects for water- and wildlife-based recreation activities dependent on these water sources (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

Proposed monitoring measure:

Water resources monitoring measure GW-WR-3a would monitor springs and streams at risk from groundwater drawdown. GW-WR-3a (Comprehensive Water Resources Monitoring Plan) would be implemented for surface water sites identified as critical to providing early warning of potential effects to federal water rights and vital water-dependent habitat identified by the BLM (see Water Resources, Section 3.3.2, for complete wording of GW-WR-3a).

Mitigation Recommendations:

Monitoring and mitigation measures recommended in Sections 3.3, Water Resources and 3.7, Aquatic Biological Resources for springs and streams within recreation areas would be used to avoid or minimize adverse effects on game fisheries.

Water resources mitigation measure GW-WR-7 would assist in avoiding or minimizing impacts to hydric soils due to groundwater drawdown. Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As described in Water Resources Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements. (See Water Resources, Section 3.3, for complete wording of GW-WR-7).

Potential residual impacts include:

- The COM Plan, ACMs, and water resources monitoring and mitigation measures could be effective in reducing impacts to aquatic biological resources within recreation areas. One relevant objective of the COM Plan to recreation is to avoid adverse environmental impacts to habitat for fish and wildlife. Localized effects for water- and wildlife-based recreation activities dependent on water sources within the GBNP, Loneliest Highway SRMA, Pioche SRP area, and North Delemar SRMA identified as medium to high risk of being affected by groundwater drawdown. It is not possible to determine the level of impact reduction at this time. Residual effects on recreation could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to water-dependent recreation could occur at some locations.

3.9.2.10 Alternatives A through F

Groundwater Development Areas

The impacts to recreation that could result from construction, operation, and maintenance of groundwater development areas for Alternatives A through F are summarized in **Table 3.9-15**.

Groundwater Pumping

Drawdown effects on recreation activities would be similar to the Proposed Action. Springs and perennial streams at moderate to high risk for reduced flows within recreation areas due to pumping effects under Alternatives A though F are listed in **Tables 3.9-16** and **3.9-17**.

Applicant-committed measures:

ACM – SNWA has recognized and agreed to "avoid any effect on federal resources within the boundaries of the GBNP from groundwater withdrawal by SNWA" (**Appendix C**).

Monitoring measures GW-WR-3a (Comprehensive Water Resources Monitoring Plan) and mitigation measure GW-WR-7 (Groundwater Drawdown Effects to Federal Surface Water Resources and Federal Water Rights) would be implemented. These measures would assist in avoiding or minimizing pumping effects on recreation activities on public lands (see Water Resources, Section 3.3, for complete wording of GW-WR-3a and GW-WR-7).

Conclusion. Impacts to recreation from groundwater pumping would be less under all alternatives as compared to the Proposed Action, with the exception of Alternative B. Alternative B would generate the greatest localized impacts, due to the non-optimized spacing of wells, and this could potentially result in create greater impacts to GBNP, Cave Lake State Park, and the Loneliest Highway SRMA.

Mitigation Recommendations:

Monitoring and mitigation measures recommended in Sections 3.3, Water Resources and 3.7, Aquatic Biological Resources, for springs and streams within recreation areas would be used to avoid or minimize adverse effects on game fisheries.

Potential residual impacts include:

- The COM Plan, ACMs, and water resources monitoring and mitigation measures could be effective in reducing impacts to aquatic biological resources within recreation areas. One relevant objective of the COM Plan to recreation is to avoid adverse environmental impacts to habitat for fish and wildlife. Localized effects for water- and wildlife-based recreation activities dependent on water sources within the Cave Lake State Park, GBNP, Loneliest Highway SRMA, and North Delemar SRMA identified as medium to high risk of being affected by groundwater drawdown. It is not possible to determine the level of impact reduction at this time. Residual effects on recreation could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to water-dependent recreation could occur at some locations.

Table 3.9-15 Summary of Recreation Impacts, Proposed Mitigation, and Residual Effects from Groundwater Development for Alternatives A through F

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Construction, Operation, and Maintenance					
Same as the Proposed Action.	Under this alternative, only 2 recreation areas overlap with the groundwater development areas: Loneliest Highway SRMA (16,449 acres) and North Delamar SRMA (1,368 acres).	Same as the Proposed Action.	Under this alternative, there would be no disturbance in the Loneliest Highway SRMA. Remote recreational experiences in White Pine County would not be affected.	Alternative E would disturb less area in the Loneliest Highway SRMA (70,889 acres) than the Proposed Action. Remote recreational experiences in Snake Valley would not be affected.	Alternative E would disturb less area in the Loneliest Highway SRMA (70,889 acres) than the Proposed Action. Remote recreational experiences in Snake Valley would not be affected.
Recommended Monitoring					
GW-REC-4: (Additional Snake Valley impact data).					
Recommended Mitigation					
Com Plan mitigation related to groundwater development.					
Residual Impacts					
Same as the Proposed Action.	Potential surface disturbance in 2 recreation areas: Loneliest Highway and North Delamar SRMAs.	Same as the Proposed Action.	Potential surface disturbance in 4 recreation areas: Caliente and Pioche SRP areas and Chief Mountain and North Delamar SRMAs.	Potential surface disturbance in 5 recreation areas: Caliente and Pioche SRP areas and Chief Mountain, Loneliest Highway, and North Delamar SRMAs.	Potential surface disturbance in 5 recreation areas: Caliente and Pioche SRP areas and Chief Mountain, Loneliest Highway, and North Delamar SRMAs.

Table 3.9-16 Number of Springs in Recreation Areas at Risk of Being Affected By Drawdown Due to Pumping (Alternatives A through F)

Recreation Areas	Pumping Timeframe	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Great Basin National Park	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	2	20	0	0	0	0
	Full Build Out + 200 Years	3	30	2	2	0	0
Loneliest Highway SRMA	Full Build Out	0	6	0	0	0	0
	Full Build Out + 75 Years	11	20	3	0	5	9
	Full Build Out + 200 Years	16	22	10	0	8	11
Pioche SRP	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	1	0	9	0	1

Table 3.9-17 Miles of Perennial Streams in Recreation Areas at Risk of Being Affected By Drawdown Due to Pumping (Alternatives A through F)

Recreation Areas	Pumping Timeframe	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Cave Lake State Park	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	3	0	0	0	0
Great Basin National Park	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	6	13	0	0	0	0
	Full Build Out + 200 Years	9	15	8	8	2	4
Loneliest Highway SRMA	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	1	4	1	0	0	0
	Full Build Out + 200 Years	3	7	2	0	0	0
North Delamar SRMA	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	3	0	0	0	0

3.9.2.11 No Action

Under the No Action alternative, the ROWs would not be granted and the project would not be constructed as proposed. However, other ongoing projects and activities would continue to draw down groundwater levels. Projected drawdown impacts on springs and perennial streams at medium to high risk for reduced flows within recreation areas due to pumping effects are listed in **Tables 3.9-18** and **3.9-19**.

Table 3.9-18 Number of Springs in Recreation Areas at Risk of Being Affected By Drawdown Due to Pumping, No Action Alternative

Recreation Areas	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Caliente SRP	1	1	1
Kershaw-Ryan State Park	3	3	3
Loneliest Highway SRMA	0	0	0
Pioche SRP	9	10	10

Table 3.9-19 Miles of Perennial Streams in Recreation Areas at Risk of Being Affected By Drawdown Due to Pumping, No Action Alternative

Recreation Areas	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Caliente SRP	0	0	9
North Delamar SRMA	<1	<1	<1

Conclusion. Existing projects and activities under the No Action Alternative could potentially affect some springs and perennial streams in the Caliente SRP area, Kershaw-Ryan State Park, Pioche SRP area, and North Delamar SRMA. This could result in localized effects for water- and wildlife-based recreation activities that are dependent on these water sources.

Potential residual impacts include:

- Localized effects for water- and wildlife-based recreation activities dependent on these water sources within the Caliente SRP area, Kershaw-Ryan State Park, Pioche SRP area, and North Delamar SRMA identified as medium to high risk of being affected by the groundwater drawdown. More details on the anticipated changes in overall plant communities and wildlife habitat are provided in Sections 3.5, Vegetation Resources and 3.6, Terrestrial Wildlife Resources. Section 3.7, Aquatic Biological Resources, provides more information related to impacts to aquatic species, such as recreational game fisheries.

3.9.3 Cumulative Impacts

3.9.3.1 Impacts Common to All Alternatives

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Recreation

Climate change effects were not evaluated for this resource because potential effects to recreation as a result of climate change cannot be directly quantified.

3.9.3.2 Issues

Surface Disturbance

- Effects on recreation areas (e.g., SRMAs, Silver State Off-highway Vehicle Trail), NPS units, and dispersed recreation activities (e.g., biking, camping, OHV use, special events).
- Increased proliferation of OHV routes and unauthorized OHV use on ROWs.
- Conflicts with hunting or wildlife-based recreation on public and private lands.

Groundwater Pumping

- Groundwater drawdown effects on recreation setting, NPS units, and water-based activities.

3.9.3.3 Assumptions

Surface Disturbance

- Construction activities and resulting development would influence popular dispersed recreation activities in the region and could temporarily limit access to these areas.
- BLM management prescriptions and guidance would be followed.

Groundwater Pumping

- Alterations to vegetation and wildlife habitat caused by groundwater pumping would influence the recreation experience.
- Groundwater drawdown that affects surface water resources could affect water-based recreation activities.

3.9.3.4 Methodology for Analysis

The cumulative impacts of construction of the GWD Project should take into account all surface-altering actions that would be likely to occur and that might affect recreation areas and recreation uses in the project region. Using the impact analysis for the ROWs and groundwater development areas, impacts from other RFFAs identified in Chapter 2 were considered. Any potential overlap with recreation areas and potential conflicts between recreational uses and construction activities are identified as an impact.

3.9.3.5 No Action

Surface Disturbance

Other RFFAs in the region of study would affect recreation resources and recreation areas regardless of the GWD Project since much of the area is open to dispersed recreation. Planned construction projects may increase the presence of surface disturbance, noise, and sights and sounds of other people during construction in these areas, which would detract from the natural character of the area and diminish the recreation experience in the short-term. Impacts would be greater near popular use areas and developed recreation sites. Projects that occur concurrently or sequentially would have greater and more noticeable impacts on recreation uses. While all recreation use types would be affected, impacts from construction intrusions would be greater for non-motorized based uses.

The temporary effects that occur during construction would generally be more disruptive than occasional long-term operational and maintenance activity. Minimal long-term adverse impacts to dispersed recreation use would result from alteration of the recreation setting in areas with aboveground structures and vegetation alteration. Multiple projects within known recreation areas could alter the recreation setting and potentially displace some recreation users.

Concurrent and sequential construction projects during hunting, typical fishing, or other active wildlife seasons could adversely affect these activities, by creating additional noise, disrupting habitat that attracts wildlife and bird species, and increased human presence. Cumulative adverse effects to wildlife habitat could have indirect effects on recreational resources through reduced wildlife populations available for hunting, bird-watching, or nature photography, although the combination of projects needed to have a noticeable effect on wildlife populations is not foreseen.

Improvement of existing primitive roads in conjunction with development projects on public lands can have a beneficial cumulative effect on recreation by creating new access routes for use of public lands. Conversely, the recreation setting could be adversely impacted by the cumulative proliferation of access routes.

Groundwater Pumping

For the No Action alternative, the ROWs would not be granted and the project would not be constructed as planned. However, other planned projects and activities would occur that would affect groundwater levels. Cumulative drawdown impacts to springs and perennial streams at medium to high risk for reduced flows within recreation areas due to groundwater drawdown under the No Action alternative are listed in **Tables 3.9-20** and **3.9-21**, respectively.

Table 3.9-20 Number of Springs in Recreation Areas at Risk of Being Affected By Drawdown Due to Cumulative Pumping with No Action

Recreation Areas	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Caliente SRP	8	11	11
Kershaw-Ryan State Park	3	3	3
Pioche SRP	9	10	10

Table 3.9-21 Miles of Perennial Streams in Recreation Areas at Risk of Being Affected By Drawdown Due to Pumping Effects, No Action

Recreation Areas	Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Caliente SRP	9	9	9
Lake Mead National Recreation Area	<1	<1	<1
North Delamar SRMA	<1	<1	6
Overton WMA (falls within the Lake Mead National Recreation Area)	<1	<1	<1

Conclusion. Other RFFAs in the region of study would affect dispersed recreation, wildlife-based recreation, and route proliferation regardless of the GWD Project since much of the area is open to dispersed recreation. Impacts would be greater near popular use areas and developed recreation sites. The temporary effects that occur during construction would generally be more disruptive than occasional long-term operational and maintenance activity.

Existing projects and activities under the No Action Alternative could potentially impact some springs and perennial streams in the Caliente SRP area, Kershaw-Ryan State Park, Pioche SRP area, Lake Mead National Recreation Area, North Delamar SRMA, and Overton WMA.

3.9.3.6 Proposed Action

Surface Disturbance

The GWD Project would contribute to cumulative effects to recreational resources where other RFFAs are in the immediate vicinity of the proposed project, such as pipelines or transmission lines in the same utility corridor. The Spring Valley Wind project, TransWest Express, Zephyr, and ON Transmission Line projects would affect the same recreation areas affected by the GWD Project. The Spring Valley Wind and ON Transmission Line projects would affect the Loneliest Highway SRMA, and the ON Transmission Line also would affect the Silver State Trail Backcountry Byway. In addition, much of the public lands crossed by the proposed pipeline are open to dispersed recreation. Concurrent construction projects may increase the presence of surface disturbance, noise, and visual presence of other people during construction in these areas, which would detract from the natural character of the area and diminish the recreation experience in the short-term. Impacts would be greater near popular use areas and developed recreation sites in the southern portions of the project area, which receives more recreation use due to its proximity to Las Vegas, than the northern portions of the project area. Projects that occur concurrently or sequentially would have greater and more noticeable impacts on recreation uses. However, the likelihood of construction concurrent with the GWD Project is low. While all recreation use types would be affected, impacts from construction intrusions would be greater for non-motorized based uses.

The temporary effects that occur during construction would generally be more disruptive than occasional long-term operational and maintenance activity. Minimal long-term adverse impacts to dispersed recreation use in these areas would result from alteration of the recreation setting in areas with aboveground structures and vegetation alteration. Multiple projects within known recreation areas could alter the recreation setting and potentially displace some recreation users. This cumulative effect could occur in the Loneliest Highway SRMA and Silver State Trail Backcountry Byway.

Concurrent construction projects during hunting, fishing, or other active wildlife seasons could adversely affect these activities, by creating additional noise, disrupting habitat that attracts wildlife and bird species, and increased human presence. Cumulative adverse effects to wildlife habitat could have indirect effects on recreational resources through reduced wildlife populations available for hunting, bird-watching, or nature photography, although the combination of projects needed to have a noticeable effect on wildlife populations is not foreseen.

Improvement of existing primitive roads in conjunction with development projects on public lands can have a beneficial cumulative effect on recreation by creating new access routes for use of public lands. Conversely, the recreation setting could be adversely impacted by the cumulative proliferation of access routes.

Groundwater Pumping

Drawdown effects may reduce water levels in ponds, springs, and perennial streams and alter vegetation, which could change the recreation setting and wildlife use patterns and subsequently affect wildlife-based recreation including hunting, wildlife viewing, bird watching, and fishing. More details on the anticipated changes in overall plant communities and wildlife habitat are provided in Sections 3.5, Vegetation Resources and 3.6, Terrestrial Wildlife Resources. Section 3.7, Aquatic Biological Resources, provides more information related to impacts to aquatic species, such as recreational game fisheries. Springs and perennial streams at moderate to high risk for reduced flows within recreation areas due to groundwater drawdown under the Proposed Action are listed in **Tables 3.9-22** and **3.9-23**, respectively.

Table 3.9-22 Springs in Recreation Areas at Risk from Groundwater Pumping (10-foot Drawdown Contour) for No Action Cumulative, Proposed Action, and Cumulative with the Proposed Action[1]

Recreation Area	Cumulative with No Action			Proposed Action			Cumulative with Proposed Action		
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Caliente SRP	8	11	11	0	0	0	8	11	11
Great Basin National Park	0	0	0	0	2	3	0	2	3
Kershaw-Ryan State Park	3	3	3	0	0	0	3	3	3
Pioche SRP	9	10	10	0	0	1	9	10	10
Loneliest Highway SRMA	0	0	0	2	18	19	4	18	19

[1] Acreages are based on drawdown models outputs and are not additive. Information presented is approximate and intended to display incremental effects of the project in relation to other projects in the region.

Table 3.9-23 Miles of Perennial Streams in Recreation Areas at Risk from Groundwater Pumping (10-foot Drawdown Contour) for No Action Cumulative, Proposed Action, and Cumulative with the Proposed Action[1]

Recreation Area	Cumulative with No Action			Proposed Action			Cumulative with Proposed Action		
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Caliente SRP	9	9	9	0	0	0	9	9	9
Great Basin National Park	0	0	0	0	6	10	0	8	10
Lake Mead National Recreation Area	<1	<1	<1	0	0	0	<1	<1	<1
North Delamar SRMA	<1	<1	6	0	0	3	<1	4	9
Overton WMA	<1	<1	<1	0	0	0	<1	<1	<1
Loneliest Highway SRMA	0	0	0	0	1	4	0	2	4

[1] Acreages are based on drawdown models outputs and are not additive. Information presented is approximate and intended to display incremental effects of the project in relation to other projects in the region.

The Proposed Action could contribute incremental effects under cumulative pumping to streams and springs within four areas: Pioche SRP, GBNP, Loneliest Highway SRMA, and the North Delamar SRMA (**Tables 3.9-22** and **3.9-23**). This alternative would contribute all of the potential effects in GBNP and the Loneliest Highway SRMA. The relative contribution to cumulative effects would be 10 percent in the Pioche SRP and 33 percent in the North Delamar SRP. No Action pumping contributes all of the effects in the Caliente SRP, Kershaw-Ryan State Park, Overton WMA, and Lake Mead National Recreation Area.

Conclusion. The GWD Project could contribute to cumulative effects to dispersed recreation, wildlife-based recreation, and route proliferation where other RFFAs are in the immediate vicinity of the proposed project. These incremental effects could potentially occur in the Pioche SRP, GBNP, Loneliest Highway SRMA, and North Delamar SRMA, based on spring and perennial stream parameters for recreation areas. Proposed Action pumping would contribute most or all of the effects in GBNP and the Loneliest Highway SRMA. No action pumping would contribute most of the effects in the North Delamar SRMA and Pioche SRP, with a small contribution from the Proposed Action. Impacts

would be greater near popular use areas and developed recreation sites in the southern portions of the project area, which receives more recreation use due to its proximity to Las Vegas, than the northern portions of the project area. The temporary effects that occur during construction generally would be more disruptive than occasional long-term operational and maintenance activity.

Groundwater drawdown is projected to be greater than 10 feet for some springs and perennial streams in the Caliente SRP area, GBNP, Kershaw-Ryan State Park, Loneliest Highway SRMA, Pioche SRP area, Lake Mead National Recreation Area, North Delamar SRMA, and Overton WMA.

3.9.3.7 Cumulative Analysis – Alternatives A through F

Surface Disturbance

Cumulative impacts to recreation resources from surface disturbance associated with the GWD Project and other RFFAs would be similar to the Proposed Action. Alternatives D, E, and F would have the least contribution of impacts to recreation resources in White Pine County and Snake Valley.

Groundwater Pumping

Drawdown effects on recreation activities would be similar to the Proposed Action. Springs and perennial streams at moderate to high risk for reduced flows within recreation areas due to pumping effects under Alternatives A though F are listed in **Tables 3.9-24** and **3.9-25.**

Table 3.9-24 Number of Springs in Recreation Areas at Risk of Being Affected By Drawdown Due to Pumping Cumulative with Alternatives A through F

Recreation Areas	Pumping Timeframe	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Caliente SRP	Full Build Out	8	8	8	8	8	8
	Full Build Out + 75 Years	11	11	11	10	11	11
	Full Build Out + 200 Years	11	11	11	11	11	11
Great Basin National Park	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	2	20	2	0	0	0
	Full Build Out + 200 Years	3	30	3	2	2	2
Kershaw-Ryan State Park	Full Build Out	3	3	3	3	3	3
	Full Build Out + 75 Years	3	3	3	3	3	3
	Full Build Out + 200 Years	3	3	3	3	3	3
Loneliest Highway SRMA	Full Build Out	0	6	0	0	0	1
	Full Build Out + 75 Years	13	20	9	0	6	11
	Full Build Out + 200 Years	16	22	11	0	8	11
Pioche SRP	Full Build Out	9	9	9	6	9	9
	Full Build Out + 75 Years	10	10	10	10	10	10
	Full Build Out + 200 Years	10	10	10	10	10	10

Table 3.9-25 Miles of Perennial Streams in Recreation Areas at Risk of Being Affected By Drawdown Due to Pumping Cumulative with Alternatives A through F

Recreation Areas	Pumping Timeframe	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Caliente SRP	Full Build Out	9	9	9	9	9	9
	Full Build Out + 75 Years	9	9	9	9	9	9
	Full Build Out + 200 Years	9	9	9	9	9	9
Cave Lake State Park	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	3	0	0	0	0
Great Basin National Park	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	6	13	4	0	0	0
	Full Build Out + 200 Years	9	15	9	8	8	8
Lake Mead National Recreation Area	Full Build Out	<1	<1	<1	<1	<1	<1
	Full Build Out + 75 Years	<1	<1	<1	<1	<1	<1
	Full Build Out + 200 Years	<1	<1	<1	<1	<1	<1
Loneliest Highway SRMA	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	1	4	1	0	0	0
	Full Build Out + 200 Years	4	7	3	0	0	0
North Delamar SRMA	Full Build Out	<1	<1	<1	<1	<1	<1
	Full Build Out + 75 Years	3	4	3	<1	3	3
	Full Build Out + 200 Years	6	9	6	6	6	7
Overton WMA	Full Build Out	<1	<1	<1	<1	<1	<1
	Full Build Out + 75 Years	<1	<1	<1	<1	<1	<1
	Full Build Out + 200 Years	<1	<1	<1	<1	<1	<1

All of the alternatives (A through F) would result in a lesser extent of drawdown impacts to recreational resources, as compared to the Proposed Action, with the exception of Alternative B. Alternative B would result in greater localized drawdown impacts to Cave Lake State Park, GBNP, the Loneliest Highway SRMA, and the North Delamar SRMA. The patterns of incremental contributions from Alternatives A through F would be the same as the Proposed Action. Individual alternatives would contribute most or all of the cumulative effects in GBNP and the Loneliest Highway SRMA. Alternative B would contribute all of the cumulative effects in Cave Lake State Park. Individual alternatives would contribute a relative small portion of cumulative effects on recreation resources in the North Delamar SRMA and Pioche SRP. The No Action Alternative would contribute all of the cumulative effects in the Caliente SRP, Kershaw-Ryan State park, Overton WMA, and Lake Mead National Recreation Area.

3.10 Transportation Resources

3.10.1 Affected Environment

3.10.1.1 Overview

Transportation systems within the project area include roads and highways and other transportation modes, such as railroads and airports. A road is defined as a travel route that has been improved and maintained by mechanical means to ensure relatively regular and continuous use. For the purposes of this document, the DOI definitions of road types are used (Form DI 1876, Revised 4/1/2008). These definitions are:

- Paved Road – Twenty feet or more in width. Pavement may be concrete, asphalt or macadam. Curbs and gutters not required.
- Unpaved but Improved Road – Graded, drained, and has a surface other than pavement (i.e., stone, gravel, etc.) of any width. Capable of accommodating at least one full-size passenger car.
- Unimproved Road – May or may not be graded and has a dirt surface of any width.

QUICK REFERENCE

AADT – Annual Average Daily Traffic
AFB – Air Force Base
GIS – Geographical Information Systems
NDOT – Nevada Department of Transportation
OHV – Off-Highway Vehicle
RFFA – Reasonably Foreseeable Future Actions
SH – State Highway
TIGER® – Topologically Integrated Geographic Encoding and Referencing

Transportation data were obtained from Topologically Integrated Geographic Encoding and Referencing (TIGER®) files from the U.S. Census Bureau and the National Transportation Atlas Databases. Unimproved routes used for OHV travel are addressed in the recreation section (Section 3.9, Recreation).

Transportation Resources include roads, highways, railroads, and airports; all of which occur within the project area.

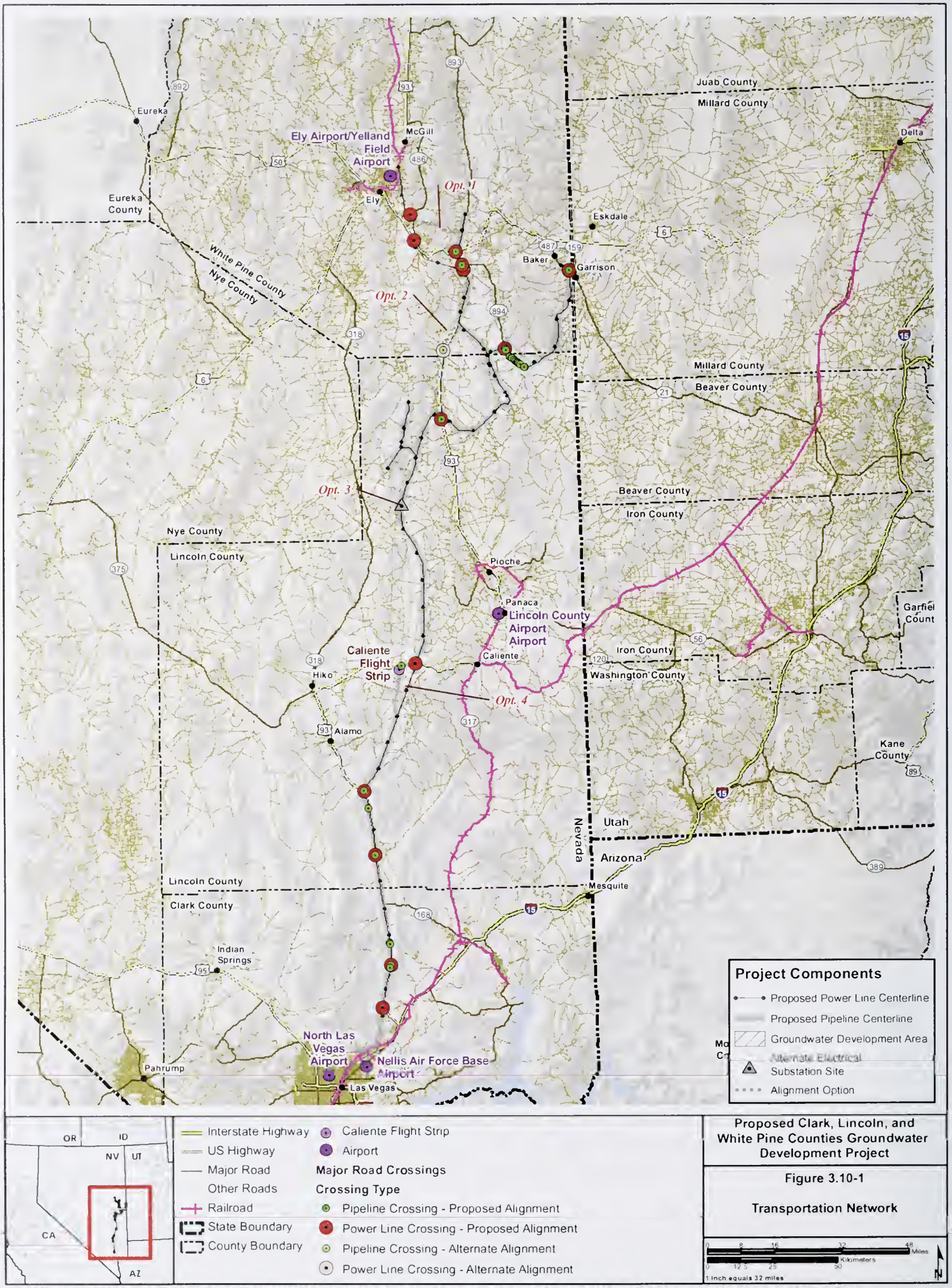
3.10.1.2 Region of Study

The region of study for transportation includes those roads and railroads that would be crossed by the proposed ROWs and ancillary facilities and groundwater development areas, as well as airports, roads, and railroads that are located within 2 miles of power lines and could be used during construction and operation of the Proposed Action or alternatives (**Figure 3.10-1**). No additional region of study is relevant for transportation because the indirect effects of groundwater drawdown are not an issue for this resource.

3.10.1.3 Rights-of-way and Ancillary Facilities

Highways and Roads

The region of study is characterized as having a few primary roads and several secondary rural roads. The major roads that would be encountered by the ROWs are a mixture of U.S. and SH. The majority of the ROWs and ancillary facilities would be in rural areas where existing traffic volumes are low. However, the ROWs and ancillary facilities would cross or be adjacent to several transportation corridors that have higher traffic volumes. These roads are shown in **Table 3.10-1**, along with their annual average daily traffic (AADT) count from 2007 and 2008 (NDOT 2008). U.S. 93 recorded the highest AADT counts, followed by U.S. 6/50 and SH 486.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

Table 3.10-1 Major Roads and Annual Average Daily Traffic (2007 and 2008) for Roads within or Intersecting the Rights-of-way and Ancillary Facilities for the Proposed Action and Alternatives

Highway or Road	AADT 2007 (Vehicles per Day)	AADT 2008 (Vehicles per Day)
Nevada SH 486	250 (estimated)	210
Nevada SH 487	180 (estimated)	170
Nevada SH 894	50 (estimated)	40
U.S. Highway 6/50, 6 miles east of Ely	1,300	1,200
U.S. Highway 6/50, near SH 893	820 (estimated)	740
U.S. Highway 93, south of McGill	3,400	3,200
U.S. Highway 93, White Pine County, south of U.S. 50	370 (estimated)	360
U.S. Highway 93, Lincoln County, north of Pioche	540	500
U.S. Highway 93, Lincoln County, west of Caliente	770	720
U.S. Highway 93, southern Lincoln County	1,700	1,700
U.S. Highway 93, north of I-15	2,100	2,100

The ROWs also cross BLM and county roads in Lincoln and White Pine counties. For the most part, these roads are maintained by the counties in which they are located. The BLM roads commonly are maintained by the counties under contract with the federal agency.

Railroads

The Union Pacific Railroad mainline from Salt Lake City, Utah to Los Angeles, California (**Figure 3.10-1**) does not cross the ROWs or ancillary facilities for any of the studied alternatives including the Proposed Action. The ROWs for the Proposed Action and alternatives would be west of the railroad, with the closest being just north of Las Vegas. The proposed power line ROW would cross the Nevada Northern Railway in two locations northeast of Ely.

It is anticipated that pipe and other major materials and equipment for the GWD Project would be delivered to a railroad siding near Caliente on the Union Pacific Railroad. From there, materials would be moved to a nearby construction support and staging area.

Airports

There are no major airports within 2 miles of the ROWs or ancillary facilities for the Proposed Action and alternatives. The nearest airport to a ROW is the Ely airport, which is approximately 2.1 miles from the proposed power line. The power line would be within a designated utility corridor at this location.

3.10.1.4 Groundwater Development Areas

Highways and Roads

Numerous unpaved but improved roads occur within the project study area. These roads are maintained by the respective county, the BLM, or both the county and the BLM. Road system maintenance is determined on an as-needed basis, depending on traffic and weather events.

In White Pine, Lincoln, and Clark counties, the BLM has observed an increase in highway and OHV travel on unpaved but improved roads and a proliferation of informal travel routes as a result of increased access from unpaved but improved roads. Some of these informal travel routes are connections between paved or unpaved but improved roads and designated OHV areas, such as the proposed Silver State Off Highway Vehicle Trail Backcountry Byway in northern Lincoln County, between highways U.S. 93 and SH 318. This travel is caused

mainly by recreational use, which can be correlated with increases in population and OHV ownership. Designated OHV areas are discussed in Section 3.9, Recreation.

Several major road crossings occur within the groundwater development areas in White Pine County. These crossings include the following:

- U.S. 6/50 and 93; and
- SHs 487, 893, and 894.

U.S. 93—one of the region's major thoroughfares—is a north-to-south route that connects Las Vegas to Ely. U.S. 6 and 50 traverse east to west and southwest to northeast, respectively, with a common alignment through a portion of the groundwater development area east of Ely. Most of these roads receive light rural traffic.

Railroads

The Union Pacific Railroad mainline from Salt Lake City, Utah to Los Angeles, California crosses the project area from northeast to southwest, passing through Caliente and Las Vegas (**Figure 3.10-1**). However, the rail line does not cross the groundwater development areas.

Airports

Five primary airports are within the region of interest: Ely, Lincoln County, Henderson Executive Airport, North Las Vegas, and McCarran International airports (**Figure 3.10-1**).

- The Ely Airport (Yelland Field), located north of Ely, receives limited commercial service;
- The Lincoln County Airport, located just west of Panaca along U.S. 93, accepts small, two-engine aircraft; and
- North Las Vegas Airport and McCarran International Airport, located north and south of Las Vegas, respectively, service Las Vegas and are south of the Proposed Action and alternatives.

Henderson Executive Airport services mainly corporate aircraft needs. The airport has a terminal building, private aircraft storage hangers, and a stand-alone air traffic control tower. The airport is located south and west of the city of Henderson and south of the project area.

In addition, Nellis AFB, on the north side of Las Vegas, supports a variety of military operations including supersonic aircraft. For this reason, large portions of Lincoln and Clark counties are designated as Military Operations Areas. A variety of aircraft that operate from Nellis AFB regularly use this airspace during training operations. The southern terminus of the Proposed Action and alternatives is in the vicinity of Nellis AFB.

An unmaintained, emergency, dirt airstrip—the Caliente Flight Strip—is in southern Dry Lake Valley, near the pipeline alignment for the Proposed Action and the alignment options (except the North Delamar alternative). However, the airstrip is not located within the groundwater development areas. This was one of many airstrips that were constructed during World War II for the emergency use of military aircraft. The airstrip was closed prior to 2000.

3.10.2 Environmental Consequences

3.10.2.1 Rights-of-way and Ancillary Facilities

Issues

The following issues for transportation are discussed as part of the impact analysis for construction and operation.

- Potential effects of increased traffic during the construction period.
- Temporary loss of access because of construction or maintenance activities.
- Potential effects of unauthorized OHV use on temporary roads and designated access roads.

Assumptions

The following assumptions were used in the impact analysis for transportation:

- Vehicle traffic on major roads that cross proposed construction areas could be affected during construction or maintenance operations. Increased construction traffic might affect the safety of the traveling public.
- SNWA would either maintain traffic safety where pipelines and power lines cross construction roads and railroads or would provide alternate routes.
- SNWA would take measures to reduce the impacts of increased traffic that would result from project worker travel, materials delivery, and other construction activities.
- Project access roads would not be available for public use and SNWA would take measures to limit public use of these roads.

Methodology for Analysis

All potential crossings of roads and constructed ROWs and facilities were identified through GIS analysis to identify areas where traffic delays and congestion could occur. It was then determined which primary roads would be used by construction equipment and workers to access project sites using estimates of worker and heavy-machinery traffic.

3.10.2.2 Proposed Action, Alternatives A through C

Construction and Facility Maintenance

Potential Effects of Increased Traffic during the Construction Period

Construction activities could result in short-term impacts on transportation infrastructure. These impacts could include disruption to traffic flow due to the movement of construction equipment, materials, and crew members; construction of pipeline and power line facilities across existing roads and railways; and damage to local roads from the movement of heavy construction equipment and materials. The number of major road crossings is listed in **Table 3.10-2**. The pipeline and power line ROW would cross existing roads in several locations. While Lincoln County roads bear the majority of the ROW crossings, U.S. 93 is the highway most transected by both pipelines and power lines. Major road crossing locations are identified in **Figure 3.10-1**.

Construction across paved roads, unpaved roads where traffic cannot be interrupted, and railroads would result in short-term impacts on public transportation while construction activities pass through the project area. Such crossings generally would be completed by boring under the feature. There would be little or no disruption of traffic at road or railroad crossings by use of this technique. Jack and bore construction is anticipated at crossings with U.S. Highways 93 and 6/50. Jack and bore also may be used to cross state highways (SH 486, 487, 894) depending on NDOT requirements. Most unpaved but improved roads would be crossed using the open-cut method, requiring a temporary road closure and establishment of detours or one-lane closure with traffic management.

Table 3.10-2 Major Road Crossings near Construction Activities for the Proposed Action and Alternatives A through C

Road	Number of Crossings		
	Pipeline Centerline	Power Line Centerline	Total
SR 486	0	1	**1**
SR 487	1	1	**2**
SR 894	4	2	**6**
U.S. 6/50	1	2	**3**
U.S. 93	7	6	**13**
BLM in White Pine County	2	3	**5**
BLM in Lincoln County	18	13	**31**
White Pine County	4	4	**8**
Lincoln County	17	15	**32**
Clark County	10	4	**14**
USFS in White Pine County	3	5	**8**
USFS in Lincoln County	0	1	**1**

The proposed power line would cross the Northern Nevada Railway in two locations northeast of Ely, but construction methods should eliminate any impacts to rail transportation in this area. The pipeline construction ROW would come within 100 feet of an existing siding of the Union Pacific railway near the southern terminus of the project but would not cross the railway. No impacts are expected to occur to rail transportation in this area.

Although the proposed project does not cross any major highways, near the construction support site (near U.S. 93 and SH 317, west of Caliente), increased traffic would be generated on these major roads during the movement of equipment and materials. The Caliente area construction support site may be used during construction for pipe fabrication, pipe and equipment storage, temporary construction management offices, and other construction support activities..Materials, including pipe, would be delivered to the Caliente site from an existing railroad line. A primary access road would be constructed within the pipeline ROW, which would be used for transport of equipment, materials, and personnel during construction.

Projected construction employment during the course of the project is summarized in **Table 3.10-3**. The peak construction workforce is projected to be no more than 950 people in a given year. Construction personnel would be distributed throughout several regions, with the majority of workers being employed on the main pipeline and the facilities in Hidden, Garnet, and Las Vegas valleys. The GWD Project would make use of carpooling or transporting workers by bus to reduce traffic. Assuming an average of 2.5 workers per car per trip, there would be an average of 373 worker roundtrips in the peak construction year. As identified in Section 3.18, Socioeconomics and Environmental Justice, initially most workers would be from or live in Clark County, commuting daily to their job sites. Over time, most construction workers would seek temporary housing in Lincoln and White Pine Counties. U.S. 93 would bear the majority of worker trips to the construction support site and project access roads. The use of buses would further reduce worker trips.

Table 3.10-3 Estimated Peak Construction Workforce, by Year (Number of Personnel) for the Proposed Action and Alternatives A through C

Construction by Region	Year of Project Development Activity											
	Construction Begins	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11
Main pipeline	5	154	332	451	364	267	130	0	0	0	0	0
Main power line	0	0	88	89	89	89	48	0	0	0	0	0
Snake Valley North facilities and Snake Valley lateral	0	0	0	0	0	0	0	0	0	0	98	135
Snake Valley South facilities and Snake Valley lateral	0	0	0	0	0	0	0	0	0	272	317	131
Spring Valley North facilities and Spring Valley lateral	0	0	0	0	0	41	42	132	71	0	0	0
Spring Valley South facilities	0	0	0	0	71	139	234	151	0	0	0	0
Lake and Cave valleys facilities and Cave Valley lateral	0	0	0	0	72	72	0	0	0	0	0	0
Dry Lake Valley facilities	0	0	45	46	32	0	0	0	0	0	0	0
Delamar and Coyote Spring valleys facilities	0	0	99	104	0	0	0	0	0	0	0	0
Hidden, Garnet, and Las Vegas valleys facilities	0	70	203	242	285	0	0	0	0	0	0	0
Estimated Total Per Year	**5**	**224**	**767**	**932**	**913**	**608**	**454**	**283**	**71**	**272**	**415**	**266**

Source: SNWA 2011.

In addition, there would be traffic during construction associated with the transport of construction equipment and materials for the pipelines, power lines, and ancillary facilities. Most of the equipment and materials would be received at the construction support site near Caliente and then transported on U.S. 93 to connect with appropriate secondary roads near the desired destination points or staging sites along the ROW. Material deliveries would include backfill and bedding soil materials between the proposed borrow pits and points along the ROW, building materials (sections of pipe, pumps, motors, concrete block, cement, reinforcing steel bars, gravel, and sand), fuel for construction equipment, water for dust control and construction uses, and maintenance trucks for sanitary facilities. For the purposes of analysis, it is assumed that construction traffic associated with movement of equipment and deliveries would constitute an average of 125 roundtrips per day during peak construction.

The combination of worker trips and construction traffic, estimated to be about 500 roundtrips per day during peak construction, could create temporary congestion and delays on the access roads that are identified on **Figure 2.5-5** and on other roads that would be used to transport workers and equipment, such as the following:

- I-15;
- U.S. Highways 93, 6 and 50; and
- Nevada State Highways 168, 317, 318, 319, 320, 487 893, and 894.

Several other unpaved roads that Lincoln and White Pine counties maintain also might be used:

- Cave Valley Road (from Ely into Cave Valley);
- Atlanta Road (from U.S. 93 to the pipeline alignment in Spring Valley);
- Stampede Road (from Pioche to the pipeline alignment in Dry Lake Valley);
- Pan American/Ely Springs Road (from Pioche to the pipeline alignment in Dry Lake Valley); and
- Alamo Canyon Road (from Alamo to the pipeline alignment in Delamar Valley).

During operation and maintenance of the ROWs and facilities, only minimal traffic that coincides with the current levels of traffic would be anticipated.

Applicant committed measures:

ACMs would be implemented for all alternatives to avoid or minimize construction-related effects on transportation. A Construction Traffic Management plan would be developed before the start of construction for each major phase of the project to minimize the number of trips by construction workers through carpooling, construction shuttles, scheduling of work shifts and materials deliveries, designation of access routes, and other measures (ACM A.1.28). Public access routes within or across the ROWs would be maintained, or detour routes would be identified during construction activities, in coordination with the BLM and local authorities (ACM A.1.30). Signing and traffic controls would be placed well in advance of the construction area to warn motorists of any detours during construction (ACM A.1.31). Signs and persons with flags also would be used within the construction area to direct traffic as necessary (ACM A.1.32).

SNWA would use jack-and-bore construction to cross U.S. highways and potentially would use this method to cross SR 894 to minimize traffic disruption.

Proposed mitigation measures:

ROW-T-1: **Traffic Management Plan.** SNWA has committed in ACMs A.1.1 and A.1.28 to prepare a detailed Traffic Management Plan that addresses operating procedures and coordination approaches with the BLM and other appropriate agencies to minimize traffic congestion, roads needing improvement and repair, and safety measures during construction. The Plan also would include:

- An assessment of public road bridge weight restrictions and measures to reduce the risk of damage to existing bridges and road culverts.
- A commitment to monitor and repair federal, state, and county roads that are used for delivering construction materials.
- Communication procedures for notifying the public and responsible agencies of anticipated construction-related traffic and transportation issues such as temporary road closures, movement of major equipment on public roadways, and unusual levels of construction-related traffic.
- Measures to manage recreational OHV use during construction, information on how closed roadways would be managed (including signage), and how roadways would be restored to prevent unauthorized OHV uses.
- Submittal of the Traffic Management Plan for review and approval by the BLM and responsible county and state agencies.

Effectiveness: This mitigation measure would be effective. Creation and application of a traffic management plan would substantially reduce impacts to public highway traffic during the construction period and ensure that roads and bridges are repaired to current standards. There would be a continued risk of unauthorized OHV use, regardless of the closure measures implemented. Effects on other resources: There would be no additional effects of implementing this measure on environmental resources.

Conclusion: Mitigation would reduce, but not eliminate, delays that would occur as a result of construction and construction-related traffic.

Residual impacts include:

- There would be temporary delays caused by construction and construction-related traffic.

Temporary Loss of Access from Construction or Maintenance Activities

The movement of construction equipment and increased, construction-related traffic throughout the project area could cause delays, congestion, and potential collisions.

Applicant committed measures:

ACMs A.1.28, A.1.30, A.1.31, and A.1.32 would be implemented for all alternatives to avoid or minimize construction-related effects on transportation.

SNWA would use jack-and-bore construction to cross U.S. highways and potentially would use this method to cross SR 894 to minimize traffic disruption.

Proposed mitigation measures:

ROW-T-1: Traffic Management Plan. ROW-T-1 would be applied to address the issue of temporary loss of transportation access on roads.

Conclusion. Construction activities could cause temporary limitations in access. This would be offset, in part, by mitigation measures.

Residual impacts include:

- Reduced access over approximately a 12-year period during construction in areas where the pipeline and power lines cross roads.

Potential Effects of Improved Roads and Unauthorized OHV Use on Temporary Roads and Designated Access Roads

The majority of the pipeline and power line alignments are located along or adjacent to existing roads, including paved highways and improved and unimproved dirt roads. Where existing roads are within the pipeline ROW, those existing roads would be used or improved as necessary. A primary access road would be constructed within the pipeline ROW, which would be used for transport of equipment, materials, and personnel during construction. At the completion of construction, the access roads would remain for facility inspections and operations access. Access roads required for construction and operation of project facilities are shown in **Table 3.10-4**.

Table 3.10-4 Miles of Access Roads Required Under the Proposed Action and Alternatives A through C

Road Category	Existing	New	Total
Paved Road	13	5	**18**
Unpaved but Improved Road	89	197	**286**
Unimproved	27	20	**47**
Total	**129**	**222**	**351**

All roads that would be modified would be permanent and would add to transportation resources. Road ROWs would be obtained for all access roads on public land that would be used or constructed for the purposes of the project. Despite the fact that roads would be improved in conjunction with the project, long-term beneficial impacts to transportation from these improvements would be negligible because the roads would be located in fairly remote areas

that would not be anticipated to be heavily traveled. However, the improved access roads could lead to better access for unauthorized OHV use.

Applicant committed measures:

At the completion of construction, existing access roads would be restored to preconstruction conditions or better (A.1.37). All access roads would be maintained and reclaimed to the BLM's BMPs as summarized in **Table 2.3-1** and the ACMs summarized in Chapter 2. SNWA would consult with the BLM to identify all temporary construction access roads that would be reclaimed and returned to their natural state to reduce the proliferation of roads (especially where construction access roads are parallel to existing roads).

Proposed mitigation measures:

None.

Conclusion. The availability of new ROWs in proximity to existing OHV routes would likely result in unauthorized use of the project ROWs by OHVs.

Residual impacts include:

- An increase or persistent continuation of unauthorized OHV use on project ROWs due to additional opportunities for ROW access.

3.10.2.3 Alternative D

Construction and Facility Maintenance

Potential Effects of Increased Traffic during the Construction Period

Construction activities could result in short-term impacts on transportation infrastructure. These impacts could include disruption to traffic flow due to the movement of construction equipment, materials, and crew members; construction of pipeline and power line facilities across existing roads and railways; and damage to local roads from the movement of heavy construction equipment and materials. The number of major road crossings is listed in **Table 3.10-5**. The pipeline and power line ROWs would cross existing roads in several locations. While Lincoln County roads bear the majority of the ROW crossings, U.S. 93 is the highway most transected by both pipelines and power lines. Major road crossing locations are identified in **Figure 3.10-1**.

Table 3.10-5 Major Road Crossings near Construction Activities for Alternative D

Road	Number of Crossings		
	Pipeline Centerline	Power Line Centerline	Total
U.S. 93	7	5	**12**
BLM in Lincoln Co.	12	10	**22**
Lincoln County	17	15	**32**
Clark County	10	4	**14**

Construction across paved roads, unpaved roads where traffic cannot be interrupted, and railroads would result in short-term impacts on public transportation while construction activities pass through the project area. Such crossings generally would be completed by boring under the feature. There would be little or no disruption of traffic at road or railroad crossings by use of this technique. Jack and bore construction is anticipated at crossings with U.S. Highway 93. Most unpaved but unimproved roads would be crossed using the open-cut method, requiring a temporary road closure and establishment of detours or one-lane closure with traffic control.

The pipeline construction ROW would come within 100 feet of an existing siding of the Union Pacific railway near the southern terminus of the project but would not cross the railway. No impacts are expected to occur to rail transportation in this area.

Although the proposed project does not cross any major highways near the construction support site (near U.S. 93 and SH 317, west of Caliente), increased traffic would be generated on these major roads during the movement of equipment and materials. Increased traffic would not occur in White Pine County under this alternative. The Caliente area construction support site may be used during construction for pipe fabrication, pipe and equipment storage, temporary construction management offices, and other construction support activities. Materials, including pipe, would be delivered to the Caliente site from an existing railroad line. A primary access road would be constructed within the pipeline ROW, which would be used for transport of equipment, materials, and personnel during construction.

Projected construction employment during the course of the project would be less than that under the Proposed Action because construction traffic would not occur in White Pine County (**Table 3.10-6**). The peak construction workforce is projected to be no more than 950 people in any given year. Construction personnel would be distributed throughout several regions, with the majority of workers being employed on the main pipeline and the facilities in Hidden, Garnet, and Las Vegas valleys. The GWD Project would make use of carpooling or transporting workers by bus to reduce traffic. Assuming an average of 2.5 workers per car per trip, there would be an average of 373 worker roundtrips in the peak construction year 2014. As identified in Section 3.18, Socioeconomics and Environmental Justice, initially most workers would be from or live in Clark County, commuting daily to their job sites. Over time, most construction workers would seek temporary housing in Lincoln County. U.S. 93 would bear the majority of worker trips to the construction support site and project access roads. The use of buses would further reduce worker trips.

In addition, there would be traffic during construction associated with the transport of construction equipment and materials for the pipelines, power lines, and ancillary facilities. Most of the equipment and material would be received at the construction support site near Caliente and then transported on U.S. 93 to connect with appropriate secondary roads near the desired destination points or staging sites along the ROW. Material deliveries would include backfill and bedding soil materials between the proposed borrow pits and points along the ROW, building materials (sections of pipe, pumps, motors, concrete block, cement, reinforcing steel bars, gravel, and sand), fuel for construction equipment, water for dust control and construction uses, and maintenance trucks for sanitary facilities. For the purposes of analysis, it is assumed that construction traffic associated with movement of equipment and deliveries would constitute an average of 125 roundtrips per day during peak construction.

Table 3.10-6 Estimated Peak Construction Workforce, by Year (Number of Personnel) for Alternative D

Construction by Region	Year of Project Development Activity							
	Construction Begins	+1	+2	+3	+4	+5	+6	+7
Main pipeline	5	154	332	451	364	267	130	0
Main power line	0	0	88	89	89	89	48	0
Spring Valley South facilities	0	0	0	0	71	139	234	151
Lake and Cave valleys facilities and Cave Valley lateral	0	0	0	0	72	72	0	0
Dry Lake Valley facilities	0	0	45	46	32	0	0	0
Delamar and Coyote Spring valleys facilities	0	0	99	104	0	0	0	0
Hidden, Garnet, and Las Vegas valleys facilities	0	70	203	242	285	0	0	0
Estimated Total Per Year	**5**	**224**	**767**	**932**	**913**	**567**	**412**	**157**

Source: SNWA 2011, Table 4-2. Estimates for facility construction in Snake Valley and Spring Valley north have been removed to reflect this alternative.

The combination of worker trips and construction traffic, estimated to be about 500 roundtrips per day during peak construction, could create temporary congestion and delays on the access roads that are identified on **Figure 2.5-5** and on other roads that would be used to transport workers and equipment, such as the following:

- I-15;
- U.S. Highway 93; and
- Nevada State Highways 168, 317, 318, 319, and 320.

Several other unpaved roads that Lincoln County maintains also might be used:

- Cave Valley Road (from Ely into Cave Valley);
- Stampede Road (from Pioche to the pipeline alignment in Dry Lake Valley);
- Pan American/Ely Springs Road (from Pioche to the pipeline alignment in Dry Lake Valley); and
- Alamo Canyon Road (from Alamo to the pipeline alignment in Delamar Valley).

During operation and maintenance of the ROWs and facilities, only minimal traffic that coincides with the current levels of traffic would be anticipated.

Applicant committed measures:

The same ACMs discussed for the Proposed Action would be applied to traffic effects associated with Alternative D.

Proposed mitigation measures:

ROW-T-1: Traffic Management Plan. ROW-T-1 would be applied to Alternative D.

Conclusion. Mitigation would reduce, but would not eliminate delays that would occur as a result of construction and construction-related traffic. Traffic impacts in White Pine County would not occur under this alternative, as only minor traffic associated with deliveries could be anticipated.

Residual impacts include:

- Temporary delays caused by construction and construction-related traffic. These impacts would be less than the Proposed Action and Alternatives A through C because the project would not extend into White Pine County.

Temporary Loss of Access due to Construction or Maintenance Activities

The movement of construction equipment and increased, construction-related traffic throughout the project area could cause delays, congestion, and potential collisions.

Applicant-committed measures:

The same ACMs discussed for the Proposed Action for vehicle access effects would be applied to Alternative D.

Proposed mitigation measures:

ROW-T-1: Traffic Management Plan. ROW-T-1 would be applied to Alternative D for the issue involving vehicle access effects.

Conclusion. Construction activities could cause temporary limitations in access. This would be offset, in part, by mitigation measures.

Residual impacts include:

- Reduction in access during construction in some areas where the pipeline and power line cross roads. Impacts under this alternative would be less than those under the Proposed Action and Alternatives A through C because the project would not extend into White Pine County and the construction timeframe would be reduced by 4 years.

Potential Effects of Improved Roads and Unauthorized Off-highway Vehicle Use on Temporary Roads and Designated Access Roads

The majority of the pipeline and power line alignments are located along or adjacent to existing roads, including paved highways and improved and unimproved dirt roads. Where existing roads are within the pipeline ROW, those existing roads would be used or improved as necessary. A primary access road would be constructed within the pipeline ROW, which would be used for transport of equipment, materials, and personnel during construction. At the completion of construction, the access roads would remain for facility inspections and operations access. Access roads required for construction and operation of project facilities are shown in **Table 3.10-7**.

Table 3.10-7 Miles of Access Roads Required Under Alternative D

Road Category	Existing	New	Total
Paved Road	3	0	**3**
Unpaved but Improved Road	70	229	**299**
Unimproved	14	0	**14**
Total	**87**	**229**	**316**

All roads that would be modified would be permanent and would add to transportation resources. Road ROWs would be obtained for all access roads on public land that would be used or constructed for the purposes of the project. Despite the fact that roads would be improved in conjunction with the project, long-term beneficial impacts to transportation from these improvements would be negligible because the roads would be located in fairly remote areas that would not be anticipated to be heavily traveled. However, the improved access roads could lead to better access for unauthorized OHV use.

Applicant committed measures:

The same ACMs discussed for the Proposed Action involving OHV use would be applied to Alternative D.

Proposed mitigation measures:

None.

Conclusion. The availability of new ROWs in proximity to existing OHV routes would likely result in unauthorized use of the project ROWs by OHVs.

Residual impacts include:

- An increase or persistent continuation of unauthorized OHV use on project ROWs because of additional opportunities for ROW access. These impacts would be less than under the Proposed Action and Alternatives A through C because the project would not extend into White Pine County.

3.10.2.4 Alternatives E and F

Construction and Facility Maintenance

Potential Effects of Increased Traffic during the Construction Period

Construction activities could result in short-term impacts on transportation infrastructure. These impacts could include disruption to traffic flow due to the movement of construction equipment, materials, and crew members;

construction of pipeline and power line facilities across existing roads and railways; and damage to local roads from the movement of heavy construction equipment and materials. The number of major road crossings is listed in **Table 3.10-8**. The pipeline and power line ROWs would cross existing roads in several locations. While Lincoln County roads bear the majority of the ROW crossings, U.S. 93 is the highway most transected by both pipelines and power lines. Major road crossing locations are identified in **Figure 3.10-1**.

Construction across paved roads, unpaved roads where traffic cannot be interrupted, and railroads would result in short-term impacts on public transportation while construction activities pass through the project area. Such crossings would generally be completed by boring under the feature. There would be little or no disruption of traffic at road or railroad crossings by use of this technique. Jack and bore construction is anticipated at crossings with U.S. Highways 93 and 6/50. Jack and bore also may be used to cross state highways depending on NDOT requirements and would be crossed using the open-cut method, requiring a temporary road closure and establishment of detours or one-lane closure with traffic control.

Table 3.10-8 Major Road Crossings near Construction Activities for Alternatives E and F

Road	Number of Crossings		
	Pipeline Centerline	Power Line Centerline	Total
SR 486	0	1	**1**
SR 894	1	1	**2**
U.S. 6/50	1	2	**3**
U.S. 93	7	6	**13**
BLM in White Pine County	0	3	**3**
BLM in Lincoln County	12	10	**22**
White Pine County	2	3	**5**
Lincoln County	17	15	**32**
Clark County	10	4	**14**
USFS in White Pine County	2	4	**6**

The proposed power line would cross the Northern Nevada Railway in two locations northeast of Ely, but construction methods should eliminate any impacts to rail transportation in this area. The pipeline construction ROW would come within 100 feet of an existing siding of the Union Pacific railway near the southern terminus of the project but would not cross the railway. No impacts are expected to occur to rail transportation in this area.

Although the proposed project does not cross any major highways near the construction support site (near U.S. 93 and SH 317, west of Caliente), increased traffic would be generated on these major roads during the movement of equipment and materials. The Caliente area construction support site may be used during construction for pipe fabrication, pipe and equipment storage, temporary construction management offices, and other construction support activities. Materials, including pipe, would be delivered to the Caliente site from an existing railroad line. A primary access road would be constructed within the pipeline ROW, which would be used for transport of equipment, materials, and personnel during construction.

Projected construction employment during the course of the project would be less than that under the Proposed Action because construction traffic would not occur in Snake Valley (**Table 3.10-9**). The peak construction workforce is projected to be no more than 950 people in any given year. Construction personnel would be distributed throughout several regions, with the majority of workers being employed on the main pipeline and the facilities in Hidden, Garnet, and Las Vegas valleys. The GWD Project would make use of carpooling or transporting workers by bus to reduce traffic. Assuming an average of 2.5 workers per car per trip, there would be an average of 373 worker roundtrips in the peak construction year 4. As identified in Section 3.18, Socioeconomics and Environmental Justice, initially most workers would be from or live in Clark County, commuting daily to their job sites. Over time, most construction workers would seek temporary housing in Lincoln and White Pine counties. U.S.

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93 would bear the majority of worker trips to the construction support site and project access roads. The use of buses would reduce worker trips further.

In addition, there would be traffic during construction associated with the transport of construction equipment and materials for the pipelines, power lines, and ancillary facilities. Most of the equipment and materials would be received at the construction support site near Caliente and then transported on U.S. 93 to connect with appropriate secondary roads near the desired destination points or staging sites along the ROW. Material deliveries would include haulage of backfill and bedding soil materials between the seven proposed borrow pits and points along the ROW, building materials (sections of pipe, pumps, motors, concrete block, cement, reinforcing steel bars, gravel, and sand), fuel for construction equipment, water for dust control and construction uses, and maintenance trucks for sanitary facilities. For the purposes of analysis, it is assumed that construction traffic associated with movement of equipment and deliveries would constitute an average of 125 roundtrips per day during peak construction.

Table 3.10-9 Estimated Peak Construction Workforce, by Year (Number of Personnel) for Alternatives E and F

	Year of Project Development Activity								
Construction by Region	**Construction Begins**	**+1**	**+2**	**+3**	**+4**	**+5**	**+6**	**+7**	**+8**
Main pipeline	5	154	332	451	364	267	130	0	0
Main power line	0	0	88	89	89	89	48	0	0
Spring Valley North facilities and Spring Valley lateral	0	0	0	0	0	41	42	132	71
Spring Valley South facilities	0	0	0	0	71	139	234	151	0
Lake and Cave valleys facilities and Cave Valley lateral	0	0	0	0	72	72	0	0	0
Dry Lake Valley facilities	0	0	45	46	32	0	0	0	0
Delamar and Coyote Spring valleys facilities	0	0	99	104	0	0	0	0	0
Hidden, Garnet, and Las Vegas valleys facilities	0	70	203	242	285	0	0	0	0
Estimated Total Per Year	**5**	**224**	**767**	**932**	**913**	**608**	**454**	**283**	**71**

Source: SNWA 2011, Table 4-2. Estimates for facility construction in Snake Valley have been removed to reflect this alternative.

The combination of worker trips and construction traffic, estimated to be about 500 roundtrips per day during peak construction could create temporary congestion and delays on the access roads that are identified on **Figure 2.5-5** and on other roads that would be used to transport workers and equipment, such as the following:

- I-15;
- U.S. Highways 93 and 6/50; and
- Nevada State Highways 168, 317, 318, 319, 320, 487, 893, and 894.

Several other unpaved roads that Lincoln and White Pine counties maintain also could be used:

- Cave Valley Road (from Ely into Cave Valley);
- Atlanta Road (from U.S. 93 to the pipeline alignment in Spring Valley);
- Stampede Road (from Pioche to the pipeline alignment in Dry Lake Valley);
- Pan American/Ely Springs Road (from Pioche to the pipeline alignment in Dry Lake Valley); and
- Alamo Canyon Road (from Alamo to the pipeline alignment in Delamar Valley).

During operation and maintenance of the ROWs and facilities, only minimal traffic that coincides with the current levels of traffic would be anticipated.

Applicant committed measures:

The same ACMs discussed for the Proposed Action involving increased traffic would be applied to Alternatives E and F.

Proposed mitigation measures:

ROW-T-1: Traffic Management Plan. ROW-T-1 would be applied to the issue involving increased traffic effects on roads.

Conclusion. Mitigation would reduce, but not eliminate, delays that would occur as a result of construction and construction-related traffic. Increased traffic would not be experienced in Snake Valley from construction.

Residual impacts include:

- Temporary delays caused by construction and construction-related traffic.

Temporary Loss of Access from Construction or Maintenance Activities

The movement of construction equipment and increased, construction-related traffic throughout the project area could cause delays, congestion, and potential collisions.

Applicant committed measures:

The same ACMs discussed for the Proposed Action involving effects on road access would be applied to Alternatives E and F.

Proposed mitigation measures:

ROW-T-1: Traffic Management Plan. ROW-T-1 would be applied to the issue involving effects on road access.

Conclusion. Construction activities could cause temporary limitations in access. This would be offset, in part, by mitigation measures.

Residual impacts include:

- Reduction in access during construction in some areas where the pipeline and power line cross roads. Impacts under this alternative would be less than those under the Proposed Action and Alternatives A through C because the project would not extend into Snake Valley and the construction timeframe would be reduced by 3 years.

Potential Effects of Improved Roads and Unauthorized Off-highway Vehicle Use on Temporary Roads and Designated Access Roads

The majority of the pipeline and power line alignments are located along or adjacent to existing roads, including paved highways and improved and unimproved dirt roads. Where existing roads are within the pipeline ROW, those existing roads would be used or improved as necessary. A primary access road would be constructed within the pipeline ROW, which would be used for transport of equipment, materials, and personnel during construction. At the completion of construction, the access roads would remain for facility inspections and operations access. Access roads required for construction and operation of project facilities are shown in **Table 3.10-10**.

Table 3.10-10 Miles of Access Roads Required Under Alternatives E and F

Road Category	Existing	New	Total
Paved Road	14	0	**14**
Unpaved but Improved Road	70	257	**327**
Unimproved	27	20	**47**
Total	**111**	**277**	**388**

All roads that would be modified would be permanent and would add to transportation resources. Road ROWs would be obtained for all access roads on public land that would be used or constructed for the purposes of the project. Despite the fact that roads would be improved in conjunction with the project, long-term beneficial impacts to transportation from these improvements would be negligible because the roads would be located in fairly remote areas that would not be anticipated to be heavily traveled. However, the improved access roads could lead to better access for unauthorized OHV use.

Applicant committed measures:

The same ACMs discussed for the Proposed Action involving OHV use would be applied to Alternatives E and F.

Proposed mitigation measures:

None.

Conclusion. The availability of new ROWs in proximity to existing OHV routes would likely result in unauthorized use of the project ROWs by OHVs.

Residual impacts include:

- An increase or persistent continuation of unauthorized OHV use on project ROWs because of additional opportunities for ROW access. These impacts would be less than under the Proposed Action and Alternatives A through C because the project would not extend into Snake Valley.

3.10.2.5 Alignment Options 1 through 4

Impacts for the Alignment Options (1 through 4) are identified in relation to the relevant segment of the Proposed Action and Alternatives A through C (**Table 3.10-11**).

Table 3.10-11 Transportation Impact Summary for Alignment Options 1 through 4

Alignment Option	Analysis
Alignment Option 1 (Humboldt-Toiybe Power Line Alignment) **Option Description:** Change the locations of a portion of the 230-kV power line from Gonder Substation near Ely to Spring Valley. **Applicable To**: Proposed Action, Alternatives A through C, E, and F.	Impacts associated with increased road crossings, traffic, and unauthorized OHV use for Alignment Option 1 would be the same as the comparable Proposed Action segment. This option would decrease access roads needed to 410 miles.
Alignment Option 2 (North Lake Valley Pipeline Alignment) **Option Description**: Change the locations of portions of the mainline pipeline and electrical transmission line in North Lake Valley. **Applicable To**: Proposed Action, Alternatives A through C, E, and F.	Impacts associated with Alignment Option 2 would involve increased congestion and potential traffic delays within the additional segment (approximately 8 miles) where the pipeline and power line would parallel U.S. 93. This option would decrease access roads needed to 398 miles.

Table 3.10-11 Transportation Impact Summary for Alignment Options 1 through 4 (Continued)

Alignment Option	Analysis
Alignment Option 3 (Muleshoe Substation and Power Line Alignment) **Option Description**: Eliminate the Gonder to Spring Valley transmission line, and construct a substation with an interconnection with an interstate, high voltage power line in Muleshole Valley. **Applicable To**: Proposed Action, Alternatives A through C, E, and F.	Impacts for Alignment Option 3 would be similar to those described for the Proposed Action, except that the power line construction from Gonder to Spring Valley would be eliminated along with one proposed crossing of this power line over U.S. 93/6/50 and several crossings of secondary roads in the 34-mile length. This option would decrease access roads needed to 397 miles.
Alignment Option 4 (North Delamar Valley Pipeline and Power Line Alignment) **Option Description**: Change the location of a short section of mainline pipeline in Delamar Valley to follow an existing transmission line. **Applicable To**: All alternatives.	Impacts for Alignment Option 4 would be similar to those described for the Proposed Action, except that approximately 3 miles of pipeline construction adjacent to U.S. 93 between Dry Lake Valley and Delamar Valley would be eliminated with the change in alignment. This would reduce traffic congestion and transportation demands on that segment. This option would decrease access roads needed to 363 miles.

3.10.2.6 No Action Alternative

Under the No Action Alternative, the proposed project would not be constructed or operated. No project-related transportation would occur from the GWD Project.

3.10.2.7 Comparison of Alternatives

Table 3.10-12 compares the impacts to transportation from ROW alternatives and alignment options.

Table 3.10-12 Comparison of Alternatives

Parameter	Proposed Action and Alternatives A through C	Alternative D	Alternatives E and F
Effects on Increased Traffic	Temporary increased traffic.	Same as Proposed Action with fewer impacts to White Pine County.	Same as Proposed Action with fewer impacts to Snake Valley.
Temporary Loss of Road Access	Temporary limitation of access.	Same as Proposed Action with fewer impacts to White Pine County.	Same as Proposed Action with fewer impacts to Snake Valley.
Access Roads	430 miles	316 miles	388 miles
Unauthorized Vehicle Use on Access Roads	Increased potential for unauthorized OHV use.	Same as Proposed Action with no impacts to White Pine County.	Same as Proposed Action except with no impacts to Snake Valley.

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3.10.2.8 Groundwater Development and Groundwater Pumping

Issues

- Potential effects of increased traffic during the construction period.
- Temporary loss of access because of construction or maintenance activities.
- Potential effects of unauthorized OHV use on temporary roads and designated access roads.

Assumptions

The following assumptions were used in the impact analysis for transportation:

- Vehicle traffic on major roads that cross proposed construction areas could be affected during construction or maintenance operations. Increased construction traffic might affect the safety of the traveling public.
- SNWA would either maintain traffic safety where pipelines and power line cross construction roads and railroads or would provide alternate routes.
- SNWA would take measures to reduce the impacts of increased traffic that would result from project worker travel, materials delivery, and other construction activities.
- Project access roads would not be available for public use and SNWA would take measures to limit public use of these roads.

Methodology for Analysis

All potential crossings of groundwater development areas were identified through GIS analysis to identify areas where traffic delays and congestion could occur. It was then determined which primary roads would be used by construction equipment and workers to access project sites. Since details regarding construction access roads and traffic estimates for the groundwater development areas are not available at this time, the analysis is more qualitative and comparative. Future NEPA documentation would require more detail to analyze the associated impacts to the transportation system thoroughly.

Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

3.10.2.9 Proposed Action

Groundwater Development Area

The specific locations of future collector pipelines and access roads for construction of the groundwater development areas are currently unknown. However, the types of impacts from the construction of the groundwater development areas would be similar to those that are described for the construction of ROWs and ancillary facilities. The majority of groundwater development areas would occur away from major roads, shifting the traffic burden to local roads and project-created access roads.

The miles of major roads crossing the proposed groundwater development areas are listed in **Table 3.10-13**. The boundaries of the Proposed Action groundwater development areas encompass a total of 108 miles of major highways and 468 miles of BLM roads, USFS roads, and county roads—the majority of which would occur in Spring Valley. Depending on the location of new wells and associated facilities, some of these roads would be affected by increased traffic and temporary detours during construction. Major road locations are identified in **Figure 3.10-1**.

Applicant committed measures:

The same ACMs discussed for the ROWs and ancillary facilities would be applied to the groundwater development areas.

Proposed mitigation measures:

ROW-T-1: Traffic Management Plan. ROW-T-1 would be applied to the groundwater development areas.

Table 3.10-13 Major Road Crossings With Groundwater Development Areas for the Proposed Action

Groundwater Development Area	Road	Miles of Crossing
Snake Valley	U.S. 6	5
	SH 21	0
	SH 487	11
	BLM road	12
	USFS road	8
	County road (White Pine County)	19
Spring Valley	U.S. 93	19
	U.S. 6	15
	SH 893	31
	SH 894	27
	BLM road	15
	USFS road	21
	County road (Lincoln County)	15
	County road (White Pine County)	69
Cave Valley	BLM road	22
	USFS road	0
	County road (Lincoln County)	15
Dry Lake Valley	BLM road	38
	USFS road	0
	County road (Lincoln County)	81
Delamar Valley	BLM road	26
	USFS road	0
	County road (Lincoln County)	34

Conclusion. The ACMs and recommended mitigation would reduce, but would not eliminate congestion and access limitations as a result of construction and construction-related traffic.

Potential residual impacts include:

Temporary delays caused by construction and construction-related traffic in the groundwater development areas. These impacts are expected to be infrequent and of short-term duration. An increase or persistent continuation of unauthorized OHV use on project access roads would continue to lead to proliferation of OHV routes.

Groundwater Pumping

There are no anticipated impacts to transportation from groundwater pumping.

3.10.2.10 Alternatives A through F

Groundwater Development Area

Impacts from implementing Alternatives A through F are summarized in **Table 3.10-14**.

Groundwater Pumping

There are no anticipated impacts to transportation from groundwater pumping. Impacts to transportation infrastructure from potential subsidence are addressed in Section 3.2, Geologic Resources.

Table 3.10-14 Summary of Transportation Impacts, Proposed Mitigation, and Residual Effects for Alternatives A through F, Groundwater Development Area Construction, Operation, and Maintenance

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Construction and Facility Maintenance					
Same as Proposed Action	Slightly less than Proposed Action due to more concentrated points of development.	Same as Proposed Action.	Less than Proposed Action due to project not extending into White Pine County; groundwater development areas encompass a total of 235 miles of BLM roads, USFS roads, and county roads and no major highways.	Less than Proposed Action due to project not extending into Snake Valley; groundwater development areas encompass a total of 76 miles of major highways and 336 miles of BLM roads, USFS roads, and county roads.	Less than Proposed Action due to project not extending into Snake Valley; groundwater development areas encompass a total of 76 miles of major highways and 336 miles of BLM roads, USFS roads, and county roads.
Operation and Maintenance					
Same as Proposed Action	Slightly less than Proposed Action due to more concentrated points of development.	Same as Proposed Action.	Less than Proposed Action due to project not extending into White Pine County.	Less than Proposed Action due to project not extending into Snake Valley.	Less than Proposed Action due to project not extending into Snake Valley.
Additional Mitigation					
ROW-T-1 (Traffic Management Plan)					
Conclusion					
This alternative would have similar impacts compared to the Proposed Action.	This alternative would have similar impacts compared to the Proposed Action, although there may be slightly less impacts to transportation due to more concentrated points of development.	This alternative would have similar impacts compared to the Proposed Action.	This alternative would have fewer impacts compared to the Proposed Action. There would be no need for construction and maintenance activities in White Pine County.	This alternative would have fewer impacts compared to the Proposed Action. There would be no need for construction and maintenance activities in Snake Valley.	This alternative would have fewer impacts compared to the Proposed Action. There would be no need for construction and maintenance activities in Snake Valley.
Residual Impacts					
Temporary disruption of traffic during construction activities. Potential for unauthorized OHV use on project ROWs.			Temporary disruption of traffic and access during construction activities, although to a much lesser extent in White Pine County. Potential for unauthorized OHV use on project ROWs.	Temporary disruption of traffic and access during construction activities, although to a much lesser extent in Snake Valley. Potential for unauthorized OHV use on project ROWs.	

3.10.2.11 No Action

Groundwater Development Area

Under the No Action Alternative, the proposed project would not be constructed or operated. No project-related traffic effects would occur as a result of the proposed GWD Project.

Groundwater Pumping

There are no anticipated impacts to transportation from groundwater pumping.

3.10.2.12 Alternatives Comparison

Table 3.10-15 compares the impacts to transportation from groundwater development and groundwater pumping.

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Table 3.10-15 Comparison of Alternatives—Groundwater Development and Groundwater Pumping

Parameter	Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Effects on Increased Traffic	Temporary increased traffic.	Same as Proposed Action.	Slightly less than Proposed Action due to more concentrated points of development.	Same as Proposed Action.	Same as Proposed Action with fewer impacts to White Pine County.	Same as Proposed Action with fewer impacts to Snake Valley.	Same as Proposed Action with fewer impacts to Snake Valley.
Temporary Loss of Road Access	Temporary limitation of access.	Same as Proposed Action.	Slightly less than Proposed Action due to more concentrated points of development.	Same as Proposed Action.	Same as Proposed Action with fewer impacts to White Pine County.	Same as Proposed Action with fewer impacts to Snake Valley.	Same as Proposed Action with fewer impacts to Snake Valley.
Miles of Major Road Crossings	108 miles of major highways and 468 miles of BLM, USFS, and county roads.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.	3 miles of major highways and 235 miles of BLM, USFS, and county roads.	92 miles of major highways and 412 miles of BLM, USFS, and county roads.	92 miles of major highways and 412 miles of BLM, USFS, and county roads.
Unauthorized Vehicle Use on Access Roads	Increased potential for unauthorized OHV use.	Same as Proposed Action.	Slightly less than Proposed Action due to more concentrated points of development.	Same as Proposed Action.	Same as Proposed Action with no impacts to White Pine County.	Same as Proposed Action except with no impacts to Snake Valley.	Same as Proposed Action except with no impacts to Snake Valley.
Effects From Groundwater Pumping	No impacts to transportation. Subsidence addressed in Section 3.2, Geologic Resources.	No impacts to transportation. Subsidence addressed in Section 3.2, Geologic Resources.	No impacts to transportation. Subsidence addressed in Section 3.2, Geologic Resources.	No impacts to transportation. Subsidence addressed in Section 3.2, Geologic Resources.	No impacts to transportation. Subsidence addressed in Section 3.2, Geologic Resources.	No impacts to transportation. Subsidence addressed in Section 3.2, Geologic Resources.	No impacts to transportation. Subsidence addressed in Section 3.2, Geologic Resources.

3.10.3 Cumulative Impacts

3.10.3.1 Impacts Common to All Alternatives

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Transportation

Climate change effects were not evaluated for this resource because potential effects to transportation as a result of climate change cannot be directly quantified.

3.10.3.2 Issues

- Potential effects of increased traffic during the construction period.
- Temporary loss of access because of construction or maintenance activities.
- Potential effects of unauthorized OHV use on temporary roads and designated access roads.

3.10.3.3 Assumptions

The following assumptions were used in the impact analysis for transportation:

- Vehicle traffic on major roads that cross proposed construction areas could be affected during construction or maintenance operations. Increased construction traffic might affect the safety of the traveling public.
- SNWA would either maintain traffic safety where pipelines and power line cross construction roads and railroads or would provide alternate routes.
- SNWA would take measures to reduce the impacts of increased traffic that would result from project worker travel, materials delivery, and other construction activities.

3.10.3.4 Methodology for Analysis

Using the impact analysis for the ROWs and groundwater development areas, impacts from other RFFAs identified in Chapter 2 were considered. Since construction timeframes and associated traffic volumes for the RFFAs were unavailable for most projects, the analysis was based on possible scenarios and consideration of other project approvals and transportation permits.

3.10.3.5 No Action

Under the No Action Alternative, the proposed project would not be constructed or operated. No project-related traffic effects would occur as a result of the proposed GWD Project.

3.10.3.6 Proposed Action

In the peak construction year (year 4), the GWD Project would add an estimated 500 additional daily trips to local roads and highways. The majority of this increased traffic would be associated with construction workers commuting on U.S. 93 to Caliente. Estimated daily construction traffic on local roads could double traffic volumes in some areas. Cumulative impacts to transportation would occur should the construction activities to implement the RFFAs occur

concurrently or sequentially and if they would affect the same transportation routes. Travelers could experience multiple stops and delays with concurrent projects, or a prolonged period of time during which they would experience stops and delays for sequentially occurring projects. However, the majority of the transportation routes affected by the GWD Project are located in relatively rural, undeveloped areas where traffic on roadways is minimal.

It is anticipated that the peak GWD Project construction periods would occur after the peak RFFA project construction periods (**Table 2.9-1**). It is expected that the ON Line Transmission Line Project and Eastern Nevada Transmission Line Project would be completed in the LCCRDA corridor before major GWD Project ROW work would begin in Hidden, Garnet, and Coyote Spring valleys. It is expected that the currently proposed wind energy development projects in Spring and Lake valleys would be completed well before the GWD Project construction period in these valleys. If RFFA projects construction schedules were to change and overlap with peak year construction of the GWD Project, traffic volumes on U.S. 93 between Las Vegas and Caliente would noticeably increase but the cumulative traffic volume would not be anticipated to create unacceptable levels of highway congestion due to the low traffic volumes on this stretch of U.S 93. The likelihood of concurrent construction in terms of timing and location is low and effects would be limited given the relatively rural, undeveloped area where traffic on roadways is minimal.

Anticipated cumulative impacts would be short-term, occurring during peak construction years of the GWD Project (a 5-year period from years 3 through 7 with construction traffic peaking in 2014), and localized. Long-term demands on the transportation system resulting from the GWD Project would not be anticipated. All permitted projects that undergo federal, state, or local review would be required to assess the project's demands on the transportation system and projects with long-term transportation demands would be required to upgrade the transportation system as deemed appropriate by the approving authority. Future facilities for the GWD Project should take into account all actions that might affect transportation capacity and vehicle traffic levels and safety in the project region. So long as construction of new facilities complies with local, state, and federal agency guidelines for traffic control and vehicle safety, additional adverse impacts to transportation are expected to be of limited magnitude.

All roads that would be modified would be permanent and would add to transportation resources. Road ROWs would be obtained for all access roads on public land that would be used or constructed for the purposes of the project. Despite the fact that roads would be improved in conjunction with the project, long-term beneficial impacts to transportation from these improvements would be negligible because the roads would be located in fairly remote areas that would not be anticipated to be heavily traveled. However, the improved access roads could lead to better access for unauthorized OHV use. The majority of these new roads associated with RFFAs in the southern portions of the project area could cumulatively contribute to the potential for unauthorized OHV use on project access roads and route proliferation.

Conclusion. The ACMs and recommended mitigation would reduce, but not eliminate, cumulative impacts associated with congestion and access limitations on the transportation system as a result of construction and construction-related traffic.

3.10.3.7 Alternatives A through F

Table 3.10-16 summarizes the cumulative impacts associated with Alternatives A through F.

Table 3.10-16 Summary of Cumulative Transportation Impacts, Proposed Mitigation, and Residual Effects for Alternatives A through F

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Construction and Facility Maintenance					
Same as Proposed Action	Slightly less than Proposed Action due to more concentrated points of development.	Same as Proposed Action.	Less than Proposed Action due to project not extending into White Pine County.	Less than Proposed Action due to project not extending into Snake Valley.	Less than Proposed Action due to project not extending into Snake Valley.
Operation and Maintenance					
Same as Proposed Action	Slightly less than Proposed Action due to more concentrated points of development.	Same as Proposed Action.	Less than Proposed Action due to project not extending into White Pine County.	Less than Proposed Action due to project not extending into Snake Valley.	Less than Proposed Action due to project not extending into Snake Valley.
Conclusion					
This alternative would have similar impacts compared to the Proposed Action.	This alternative would have similar or slightly less impacts compared to the Proposed Action, due to wells associated with the project being located more closely together.	This alternative would have similar impacts compared to the Proposed Action.	This alternative would have less impacts compared to the Proposed Action. There would be no need for construction and maintenance activities in White Pine County.	This alternative would have less impacts compared to the Proposed Action. There would be no need for construction and maintenance activities in Snake Valley.	This alternative would have less impacts compared to the Proposed Action. There would be no need for construction and maintenance activities in Snake Valley.

3.11 Mineral Resources

3.11.1 Affected Environment

3.11.1.1 Overview

The study area for mineral resources includes the proposed ROWs and groundwater development areas and the broader geographical area within the water resources region of study as shown in **Figure 3.11-1**. Mineral resources can be classified in a variety of ways (e.g., metallic, non-metallic, energy minerals). For purposes of this EIS, the BLM classification for different mineral groups is used.

QUICK REFERENCE

AGI – American Geological Institute

CFR – Code of Federal Regulations

NBMG – Nevada Bureau of Mines and Geology

NDOT – Nevada Department of Transportation

USGS – United States Geological Survey

Within legal constraints, publicly-owned minerals are available for exploration, development, and production, while subject to existing regulations, standard terms and conditions, and stipulations. Federally owned minerals in the public domain are classified into specific categories and these categories only apply to minerals in the federal mineral estate. These categories are locatable, leasable, and salable minerals. The classifications are based on legislation passed by the U.S. Congress.

Locatable Minerals

Locatable minerals include precious and base metallic ores and nonmetallic minerals such as bentonite, gypsum, chemical grade limestone, and chemical grade silica sand. Uncommon varieties of sand, gravel, building stone, pumice, rock, and cinders also are managed as locatable minerals. Locatable minerals are acquired under the General Mining Law of 1872, as amended, and Surface Use and Occupancy Act of July 23, 1955 (American Geological Institute [AGI] 1997).

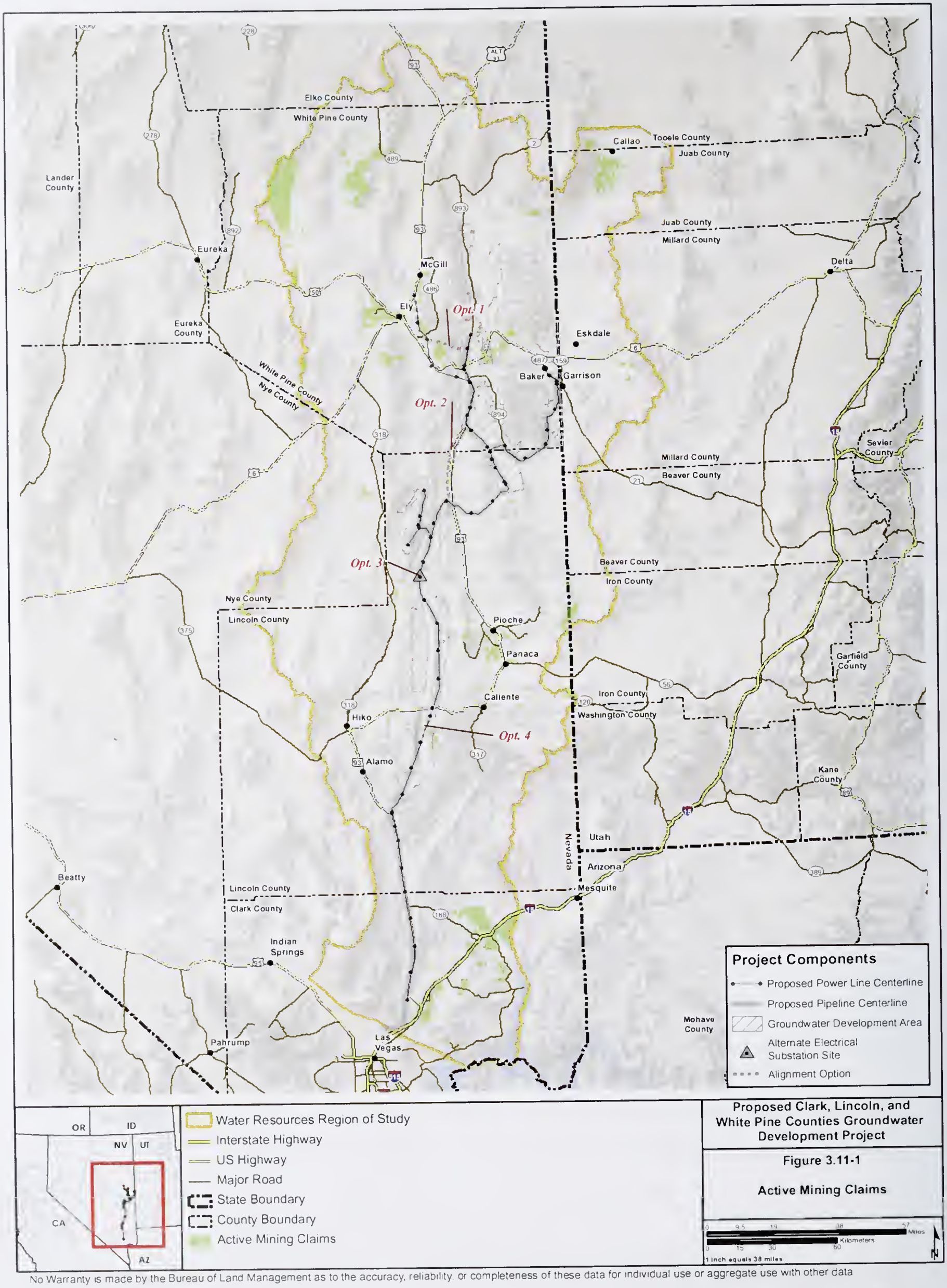
Mineral Classifications

The BLM classifies minerals as:

- Locatable (precious and base metallic ores and nonmetallic minerals)
- Leasable (fluid (e.g., oil, gas, geothermal] and solid [e.g., coal phosphates])
- Salable (common mineral materials [e.g., sand and gravel])

Important occurrences of metallic locatable minerals in the project area include gold, silver, copper, lead, zinc, uranium, beryllium, and tungsten (ENSR 2004a; Smith and Milligan 1999). Within the area of study, historic mining began shortly after the end of the Civil War. Mining districts such as the Pioche, Mount Hamilton, and Robinson (formerly the Ruth) districts were founded between 1865 and 1875. These mining districts produced some of the richest copper, silver, and zinc ores mined in the U.S. during the mining boom that lasted from 1870 to about 1895. Active mining today occurs at the Robinson District outside of Ely (copper and gold) and at the Bald Mountain Mine in northwest White Pine County (just outside of the project area). There is high potential for additional mining of precious and base metals in the project region because of recent high commodity prices, but there are no proposals for new mines. The locations of active mining claims in the project area are shown in **Figure 3.11-1**.

Non-metallic locatable minerals also occur in the area and include perlite, gypsum, clay, and building limestone. Currently, the major commodities being mined include gold, copper, perlite, gypsum, and limestone (NBMG and USGS 2009; UGS and USGS 2009).



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

Leasable Minerals

Leasable minerals are those minerals that are leased to individuals for exploration and development. The leasable minerals have been subdivided into two classes: fluid and solid. Fluid minerals include oil and gas, geothermal resources and associated by-products, oil shale, native asphalt, oil impregnated sands, and any other material in which oil is recoverable only by special treatment after the deposit is mined, or quarried. Solid leasable minerals are specific minerals such as coal and phosphates. These minerals are associated with the following laws: Mineral Leasing Act of 1920, as amended and supplemented, Mineral Leasing Act for Acquired Lands of 1947, as amended, and the Geothermal Steam Act of 1970, as amended (AGI 1997). Leasable minerals are acquired by applying to the federal government for a lease to explore and develop the minerals.

The important leasable minerals that have moderate to high potential in the project area include oil and gas and geothermal energy. Coal, although present, does not occur in quality or quantity to justify mining (ENSR 2004a). Numerous exploratory wells have been drilled for oil and gas in the water resources region of study, but to date, no commercial production has been established. Outside of the project region, in northeastern Nye County, Railroad Valley has been responsible for most of the oil production in Nevada (Garside and Hess 2007; Nevada Division of Minerals 2009). Oil production in Nevada has declined from 4.0 million barrels in 1990 to less than 500,000 barrels in 2006. The USGS has determined that undiscovered hydrocarbon resources consist of a mean of 1.6 billion barrels of oil, 1.8 trillion cubic feet of natural gas, and 85 million barrels of natural gas liquids. These resources occur in what is defined as the Eastern Great Basin hydrocarbon assessment unit that includes the eastern half of Nevada and the Great Basin portion of western Utah (USGS 2005). Oil, gas, and geothermal leases are shown on **Figure 3.11-2**.

Geothermal water also is a major potential fluid mineral resource in the project region. Eastern Nevada and western Utah have a somewhat lower geothermal potential than other areas in the Great Basin, but the lower potential is relative to the Great Basin as a whole. Because geothermal conditions are so favorable in the Great Basin, the potential resource may be a moderate potential when compared to other parts of the U.S. (Coolbaugh et al. 2005). According to Coolbaugh et al. (2005), it is possible that lateral flow in the carbonate aquifer that underlies the project area attenuates the upward movement of fluids resulting in lower heat flow to the surface. However, estimated subsurface temperatures at 6.0 kilometers (3.7 miles) in the project area range from 150 to over 200 °C (Hess 2008). There are a few hot springs in Lincoln County at Caliente and Ash springs that are used for direct-use applications (spa and heating) and there are several hot wells (temperature greater than 37 °C in the northern Spring Valley near Cherry Creek in White Pine County (Shevenell and Garside 2005). Warm springs with temperatures greater than 25 °C occur in western Juab and northwest Millard counties (Blackett and Wakefield 2002). However, there are no large-scale geothermal power generating facilities in the project area or are proposed in the near future (Hess 2008).

Salable Minerals

Salable minerals are common mineral materials that include sand, gravel, roadbed, ballast, and common clay and are sold by contract with the federal government. These have been identified as all other minerals not designated as leasable or locatable. These minerals are regulated under the Mineral Material Act of July 23, 1947, as amended, and the Surface Use and Occupancy Act of July 23, 1955 (AGI 1997). Sand and gravel resources are abundant in alluvial fan deposits along the mountain fronts. The resources generally are extracted at community pits managed by the BLM and at pits operated by the NDOT (ENSR 2004a).

3.11.1.2 Rights-of-way Areas

Locatable Minerals

No locatable minerals have been identified within the ROWs for the Proposed Action and alternatives.

Leasable Minerals

No leasable mineral production has been identified within the ROWs for the Proposed Action and alternatives. However, there is a high potential for oil and gas resources in the valley areas where most proposed project activities would take place (ENSR 2004b). There also is a moderate potential for geothermal resources in the valley areas.

Salable Minerals

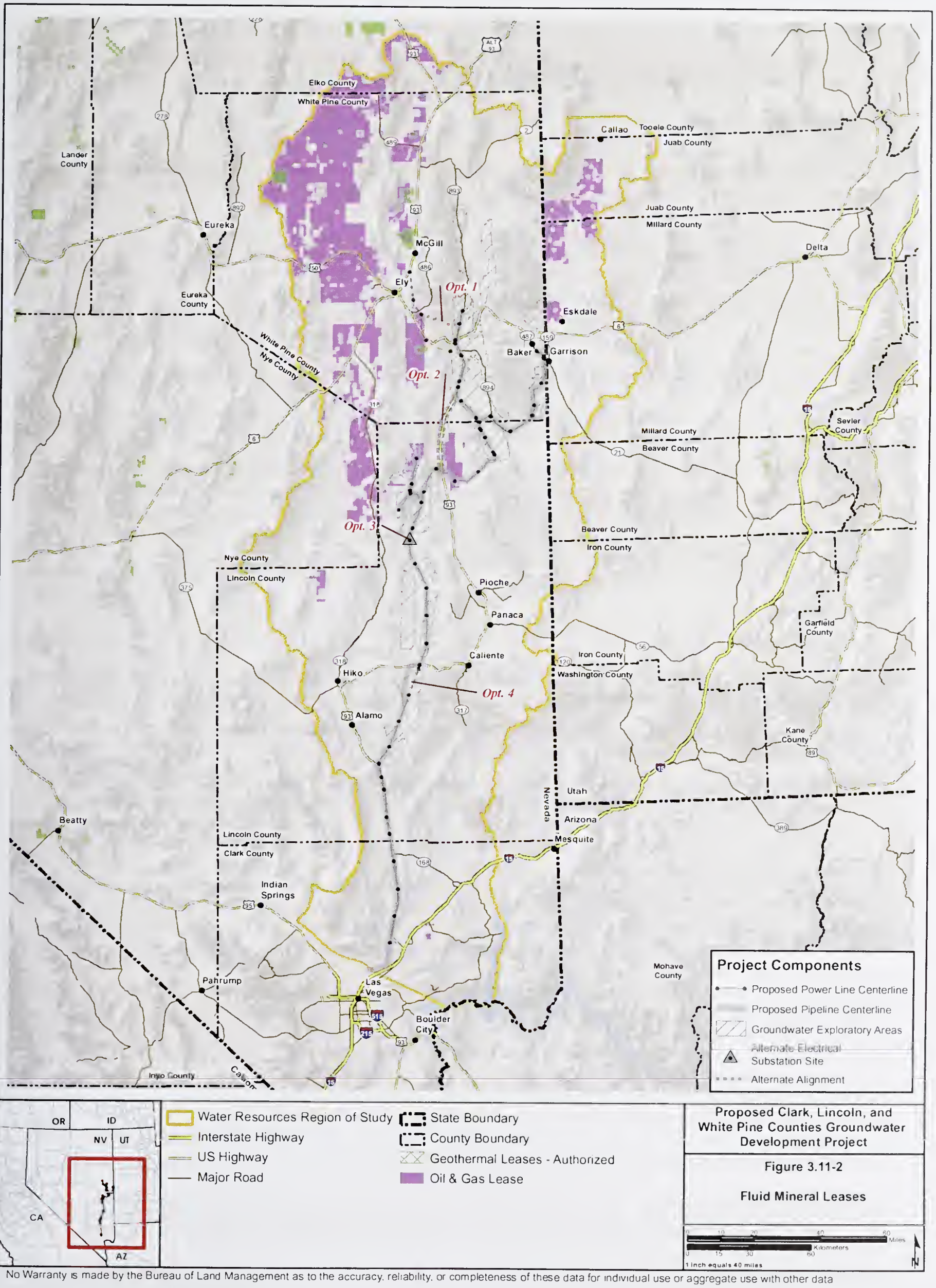
No sand and gravel pits are located within the ROWs for the Proposed Action and alternatives. Community resources are present throughout the project area.

BLM

3.11.1.3 Groundwater Development Areas

No locatable minerals or leasable mineral production have been identified for the groundwater development areas. However, potential future oil and gas and geothermal resources could be developed in the groundwater development basins. Gravel pits occur in the following locations within groundwater exploratory areas:

- Spring Valley North – adjacent to SH 983 (two locations); and
- Coyote Spring Valley – adjacent to U.S. 93.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

3.11.2 Environmental Consequences

3.11.2.1 Rights-of-way

Issues

The issues and concerns regarding potential impacts of the proposed ROW construction and maintenance to locatable, leasable, and mineral (salable) materials are listed below:

- Potential interference with existing mineral extraction operations.
- Potential for reduced access to underlying minerals.
- Potential interference with future mining operations.

Assumptions

The following assumptions were used in the impact analysis for minerals for ROW construction and maintenance:

- The BLM could approve development of minerals within ROW corridors, since the ROW is granted subject to existing rights of other parties, including the U.S. according to 43 CFR, § 2805.14.
- Under U.S. law, mineral rights and uses take precedence over other rights associated with a property (BLM 2009). Conflicts between different ownership of mineral and surface estates are referred to as "split estate" disputes. However, in the case of the ROWs proposed for this project, the federal government will in most cases be the surface and mineral estate owner, but the precedence of mineral rights applies to ROWs granted under the FLPMA. In 43 CFR, § 2805.15, the U.S. retains ownership of land resources including minerals.

Methodology for Analysis

The following lists the steps in the analysis of impacts to mineral resources:

- Review information regarding the location of existing mineral extraction operations in the vicinity of the proposed facilities as well as information regarding potential mineral resources that may be present in proposed ROWs.
- Determine if proposed ROW activities and facilities have the potential to create concerns and issues as identified above.
- Determine the compatibility of existing mineral extraction operations with proposed ROW facilities and maintenance of those facilities (i.e. surface mining likely would not be compatible; subsurface mining may be compatible).

3.11.2.2 Proposed Action, Alternatives A through C

Construction and Facility Maintenance

The proposed main and lateral ROWs do not cross and are not adjacent to active mining claims (**Figure 3.11-1**). However, the proposed ROWs cross active or pending oil and gas leases in Cave and Lake valleys. As of August 30, 2009, no production has been established on the oil and gas leases. There are a number of salable mineral materials pits near proposed ROW alignments in southern Spring, north Las Vegas, Delamar, and Pahranagat valleys. Proposed project pipeline and power facilities do not cross these present mineral operations. Establishment of ROWs under the Proposed Action and Alternatives A through C is not expected to interfere or preclude the extraction of minerals. Therefore, construction in the proposed ROWs would not impact access to or extraction of minerals, unless there are temporary restrictions to access (e.g., an open trench across an access road). Restriction of access during construction would be temporary and limited to the period of active construction.

Active Mining Claims

No active mining claims are crossed or adjacent to the proposed main and lateral pipelines.

It is anticipated that the pipeline trench would be backfilled with materials derived from the trench excavation, and it might be necessary to obtain some construction sand and gravel from local, existing commercial sources for use as pipe

padding, road base, or surface facility pads. The demand for sand and gravel would not substantially affect the long-term availability of construction materials in the area because sand and gravel resources in the area are readily available.

Establishment of the proposed ROWs and subsequent construction is not expected to preclude access to exploration and production of minerals or constitute an important loss of mineral resources. Construction of ROW facilities may require limited amounts of sand and gravel resources, but would have small impact on the potential supply of aggregate resource.

The ROWs for the proposed facilities may be in place for the duration of the project. At this time, it cannot be predicted what mineral commodities located within the proposed ROWs would become commercially viable in the future. Once ROW facilities are in place, any applications for mining operations, issuance of leases, or granting of mineral entry would have to be done with consideration of the established use of the ROWs. However, it should be noted that owners of mineral rights or their lessees have right of entry that take precedence over other uses.

Proposed mitigation measures:

None.

Conclusion. The proposed construction and permanent ROWs would not be located within currently active locatable, leasable, or salable mineral development areas. Construction activities could temporarily limit road access to adjacent mineral development areas until roadways intercepted by pipeline excavation are restored, or detours are provided. It is assumed that pipeline trenches would not remain open longer than 1 month at any 1 location. The permanent project ROWs are not expected to preclude future access to exploration and mineral production. The project would not consume a large fraction of the available aggregate (sand and gravel) resources because of the widespread availability of these commodities.

Residual impacts include:

- Potential temporary (likely no longer than 1 month) access restrictions to ongoing mineral extraction sites until roadways are restored after construction completion.

3.11.2.3 Alternative D

Construction and Facility Maintenance

The proposed construction and permanent ROWs would not be located within currently active locatable, leasable, or salable mineral development areas. The proposed ROW surface area would be less than that for the Proposed Action because no facilities would be located in northern Spring Valley and Snake Valley in White Pine County. Construction activities could temporarily limit road access to adjacent mineral development areas until roadways intercepted by pipeline excavation are restored, or detours are provided. It is assumed that pipeline trenches would not remain open longer than 1 month at any 1 location. The permanent project ROWs are not expected to preclude future access to exploration and mineral production. The project would not consume a large fraction of the available aggregate (sand and gravel) resources because of the widespread availability of these commodities.

Conclusion. Proposed construction and permanent ROWs would not preclude access to the exploration and development of mineral resources and project demand for aggregate resources would be minor compared to available resources.

Proposed mitigation measures:

None

Residual impacts include:

- Potential temporary (likely no longer than 1 month) access restrictions to ongoing mineral extraction sites until roadways are restored after construction completion.

3.11.2.4 Alternatives E and F

Construction and Facility Maintenance

The proposed construction and permanent ROWs would not be located within currently active locatable, leasable, or salable mineral development areas. The proposed ROW surface area would be less than that for the Proposed Action because no facilities would be located in Snake Valley. Construction activities could temporarily limit road access to adjacent mineral development areas until roadways intercepted by pipeline excavation are restored, or detours are provided. It is assumed that pipeline trenches would not remain open longer than 1 month at any 1 location. The permanent project ROWs are not expected to preclude future access to exploration and mineral production. The project would not consume a large fraction of the available aggregate (sand and gravel) resources because of the widespread availability of these commodities.

Conclusion. Proposed construction and permanent ROWs would not preclude access to the exploration and development of mineral resources and project demand for aggregate resources would be minor compared to available resources.

Proposed mitigation measures:

None

Residual impacts include:

- Potential temporary (likely no longer than 1 month) access restrictions to ongoing mineral extraction sites until roadways are restored after construction completion.

3.11.2.5 Alignment Options 1 through 4

There would be no differences in potential impacts to mineral resources when comparing the Alignment Options 1 through 4 to the relevant segments of the Proposed Action.

3.11.2.6 No Action

Under the No Action Alternative, there would be no potential impacts from the proposed project to mineral resources.

3.11.2.7 Comparison of Alternatives

For mineral resources there would be no impact differences between the alternatives.

3.11.2.8 Groundwater Development and Groundwater Pumping

Issues

Groundwater Development Construction and Facility Maintenance

The issues and concerns regarding potential impacts of the proposed groundwater development and maintenance to locatable, leasable, and salable mineral resources are listed below:

- Potential interference with existing mineral extraction operations.
- Potential for reduced access to underlying minerals.
- Potential interference with mining operations.

Groundwater Pumping

- The major issue of concern with regard to mineral resources is that groundwater pumping could limit the amount of water potentially available for use in mineral operations.

Assumptions

Groundwater Development Construction and Facility Maintenance

The following assumption was used in the impact analysis for groundwater development and maintenance effects on minerals:

- Presumably, the BLM could approve development of minerals within groundwater development areas, since the development would essentially be carried out on ROW grants which are subject to existing rights of other parties including the U.S. according to 43 CFR, § 2805.14.
- Under U.S. law, mineral rights and uses take precedence over other rights associated with a property (BLM 2009). Conflicts between different ownership of mineral and surface estates are referred to as "split estate" disputes. However, in the case of the ROWs proposed for this project, the federal government will in most cases be the surface and mineral estate owner, but the precedence of mineral rights applies to ROWs granted under the FLPMA. In 43 CFR, § 2805.15, the U.S. retains ownership of land resources including minerals.
- The location of wells and collector pipelines is not known at this time and final routes for those lines would be determined with consideration for active and potential mineral uses.

Groundwater Pumping

The following assumption was used in the impact analysis for minerals for groundwater pumping effects on minerals:

- The precise location of proposed groundwater pumping facilities is not known at this time; however, no groundwater wells are planned in active mining districts.

Methodology for Analysis

Groundwater Development Construction and Facility Maintenance

The following lists the steps in the analysis of impacts of groundwater development to mineral resources:

- Review information regarding the location of existing mineral extraction operations in the vicinity of the proposed facilities, as well as information regarding potential mineral resources that may be present in groundwater development areas.
- Determine if proposed activities and facilities have the potential to create concerns and issues as identified above.
- Determine the compatibility of existing and proposed mineral extraction operations with groundwater development and maintenance (i.e., surface mining likely would not be compatible; subsurface mining may be compatible).

- Determine the likelihood that additional mineral resources would be developed in the future (mine or quarry would be expanded).
- Develop possible location alternatives for water transportation components. Describe methods for ensuring mining road and utility access across active pipeline construction areas.
- Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

Groundwater Pumping

The following lists the steps in the analysis of impacts of groundwater pumping to mineral resources:

- Review the present consumptive water use for minerals in relation to projected drawdown of the various alternatives.
- Determine qualitative risk for potential effects to minerals development or use of water supplies.

3.11.2.9 Proposed Action

Groundwater Development Area

The groundwater development areas generally do not overlap with active mining claims except for claims on the east side of the Delamar Valley and claims on the east side of the Spring Valley (**Figure 3.11-1**). As of April 2011, no oil and gas production has been established in the proposed groundwater development areas. Establishment of groundwater development areas is not expected to interfere or preclude the extraction of minerals. Therefore, construction in the proposed groundwater areas would not impact access to or extraction of minerals, unless there are temporary restrictions to access (i.e., an open trench across an access road). Restriction of access during construction would be temporary and limited to when construction would be occurring.

It is anticipated that pipeline trenches would be backfilled with materials derived from the trench excavation, and it might be necessary to obtain some construction sand and gravel from local existing commercial sources for use as pipe padding, road base, or surface facility pads. These demands for sand and gravel would not substantially affect the long-term availability of construction materials in the area because of the ubiquitous nature of sand and gravel resources in the area.

The proposed groundwater development facilities may be in place indefinitely. At this time, it cannot be predicted what mineral commodities located within the proposed areas would become commercially viable in the future, especially oil and gas. Once groundwater development facilities are in place, any applications for mining operations, issuance of leases, or granting of mineral entry would have to be done with consideration of the established use of the groundwater development areas. However, it should be noted that owners of mineral rights or their lessees have right of entry that take precedence over other uses.

Conclusion. Construction and maintenance of the proposed groundwater development facilities would not prevent access to future mineral development or constitute an important loss of mineral resources or mineral availability because of the dispersed nature of the groundwater development areas relative to the expanse of areas with mineral resource potential.

Proposed mitigation measures:

None.

Potential residual impacts include:

- Potential temporary (likely no longer than 1 month) access restrictions to ongoing mineral extraction sites until roadways are restored after construction completion.

Groundwater Pumping

Withdrawal of groundwater could limit the amount of water potentially available for use in mineral operations. Based on current use, potential consumption of water by mining and milling operations in the basins proposed for pumping is relatively small (about 4,963 afy of active water rights) (Nevada Water Division of Water Resources 2011) and most of the rights are in the Spring Valley **(Table 3.11-1)**. It is possible that proposed pumping in the Spring Valley could affect mining and milling water rights. The mining and mineral water rights consist of wells, springs, and streams. Some of the drawdown effects that would be specific to mineral operations would include the following:

- An increase in the depth to groundwater, resulting in a requirement for deeper water supply wells.
- Potential flow reduction in perennial springs, seeps, and streams.
- Potential surface and groundwater right quantity reductions.

Table 3.11-1 Active Water Rights Project Area

Basin	Basin Number	Active Water Rights, Mining and Milling (Acre-feet)
Steptoe	179	84,522
Cave[1]	180	0
Dry Lake[1]	181	18
Delamar[1]	182	25
Lake	183	833
Spring[1]	184	4,920
Tippett	185	0
Snake[1]	195	0
Hamlin	196	0
Dry Valley	198	0
Spring	201	0
Patterson	202	508
Panaca	203	0
Clover	204	0
Lower Meadow Valley Wash	205	57
Kane Springs	206	0
White River Valley	207	72
Pahroc	208	0
Pahranagat	209	0
Coyote Springs Valley	210	0
Las Vegas Valley	212	1,728
Black Valley	215	1,980
Garnet	216	134
Hidden Valley (North)	217	0
California Wash	218	0
Muddy River	219	0

[1]Groundwater Development Valleys.

Source: Nevada Division of Water Resources (2011).

Section 3.3, Water Resources, provides a detailed discussion of potential effects from groundwater pumping and proposed mitigation. Because of the general lack of mining and milling water rights in the groundwater pumping basins, the effects to those rights are expected to be small. However, mining and milling water rights in Dry Lake, Delamar, Lake, and Spring valleys could be affected to varying degrees. The risk to mining and milling water rights would range from low to high depending on the particular location of the water right. Groundwater pumping would not unreasonably restrict access to existing mining and milling water rights in Dry Lake, Delamar, Lake, and Spring

valleys, and the effects could vary depending upon the location of the water right. However, senior water rights would be protected in accordance with Nevada State water law.

Conclusion: Groundwater pumping has the potential to impact potential sources of water for mineral development, but those effects are highly dependent on the location of the source. Senior water rights would be protected in accordance with Nevada State water law.

Proposed mitigation measures:

None.

Potential residual impacts include:

- The COM Plan and water resources monitoring and mitigation measures could be effective in reducing impacts to water sources for mineral development. It is not possible to determine the level of impact at this time. Residual effects on some water sources for mineral development could occur when considering the long recovery period for groundwater. Some unavoidable adverse effects on mineral development could occur at some locations.

3.11.2.10 Alternatives A through F

Groundwater Development Areas

The impacts to mineral resources that could result from construction and facility maintenance of groundwater development areas for Alternatives A through F are summarized in **Table 3.11-2**.

Table 3.11-2 Summary of Mineral Resource Impacts, Proposed Mitigation, and Residual Effects for Alternatives A through F Groundwater Development

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Construction and Facility Maintenance					
Same as the Proposed Aetion.	Same as the Proposed Aetion.	Same as the Proposed Action.	Alternative D would disturb less area (no facilities in White Pine County) as compared to the Proposed Action and would avoid temporary road aceess limitations to adjacent mineral resourees.	Same as the Proposed Action, with the following exception: • No temporary road aeeess limitations to adjacent to potcntial mineral development areas in the Snake Valley.	Same as the Proposed Action, with the following exception: • No temporary road aeeess limitations to adjacent to potential mineral development areas in the Snake Valley.
Recommended Mitigation					
None.	None.	None.	None.	None.	Nonc.
Residual Impacts					
Potential temporary (likely no longer than 1 month) access restrictions to ongoing mineral extraetion sites until roadways are restored after construetion completion.					

Groundwater Pumping

The impacts of pumping on mineral resources for Alternatives A through F are summarized in **Table 3.11-3**.

Table 3.11-3 Summary of Mineral Resource Impacts, Proposed Mitigation, and Residual Effects for Alternatives A through F Groundwater Pumping

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Due to the general laek of mining and milling water rights, potential impacts of pumping on mineral resourees is expeeted to be low; Alternative A would be lower than the Proposed Action.	Same as the Proposed Aetion.	Same as Alternative A.	Same as Alternative A exeept that there would be no impaet risk to mineral resource development in the White Pine portion of Spring or Snake valleys.	Same as Alternative A exeept that there would be less impact risk to mineral resouree development in Snake Valley.	Same as Alternative A exeept that there would be less impaet risk to mineral resouree development in Snake Valley.
Recommended Mitigation					
Same as the Proposed Action.	Same as the Proposed Aetion.	Same as the Proposed Aetion.	Same as the Proposed Aetion.	Same as the Proposed Aetion.	Same as the Proposed Action.
Residual Impacts					
Potential temporary (likely no longer than 1 month) aeeess restrietions to ongoing mineral extraction sites until roadways are restored after eonstruetion eompletion.					

3.11.2.11 No Action

Groundwater Development Area

There would be no impacts due to groundwater development since there would be no project.

Groundwater Pumping

Under the No Action, groundwater pumping would continue under status quo condition as described in Chapter 2.0, Section 2.2.

3.11.2.12 Alternatives Comparison

Groundwater Development Area

In terms of potential impacts to mineral resources by groundwater development, the alternatives would be essentially the same.

Groundwater Pumping

The potential for adverse impacts to mining and milling water rights varies with the proposed volume pumping for any given alternative. Based on the foregoing, the Proposed Action and Alternative B would pose the highest risk to mineral water rights in Spring Valley because of proposed pumping of over 91,000 afy **(Table 2.1-2)**. The other proposed groundwater pumping valleys (Delamar, Dry Lake, and Cave valleys) do not have large appropriated mineral water use rights **(Table 3.11-1).**

3.11.3 Cumulative Impacts

3.11.3.1 Impacts Common to All Alternatives

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Mineral Resources

Climate change effects were not evaluated for this resource because potential effects to mineral resources as a result of climate change cannot be directly quantified.

3.11.3.2 Issues

Rights-of-way and Groundwater Development Area Construction and Maintenance

- Potential long-term interference with existing mineral extraction operations.
- Potential for long-term reduced access to underlying minerals.
- Potential long-term interference with future mining operations.

Groundwater Pumping

- Groundwater pumping in the near and long-term has the potential to restrict water supplies for mineral extraction.

3.11.3.3 Assumptions

Rights-of-way and Groundwater Development Area Construction and Maintenance

- Long term is greater than 2 years.
- No changes in BLM ROW granting authority and ROW grant rights in the long-term.
- Precedence for right of mineral entry continues in the long-term.

Groundwater Pumping

- The precise location of proposed groundwater pumping facilities is not known at this time; however no groundwater wells are planned in active mining districts.
- A water right designated for mining and milling may not necessarily have a mining or milling operation associated with it.

3.11.3.4 Methodology for Analysis

Rights-of-way and Groundwater Development Areas

- Review information regarding the location of reasonably foreseeable future mineral extraction operations in the vicinity of the proposed facilities as well as information regarding potential mineral resources that may be present in groundwater development areas.
- Determine if proposed activities and facilities have the potential to create concerns and issues as identified above.

- Determine the compatibility of proposed mineral extraction operations with groundwater development and maintenance (i.e. surface mining likely would not be compatible; subsurface mining may be compatible).
- Determine the likelihood that mineral resources would be developed in ROWs and groundwater development areas in the long-term.

Groundwater Pumping

The following lists the steps in the analysis of impacts of groundwater pumping to mineral resources:

- Review the reasonably foreseeable projected consumptive water use for minerals in relation to projected drawdown of the various alternatives.
- Assess the qualitative risk for potential affects to water supply for minerals development.

3.11.3.5 Proposed Action, Alternatives A through F

Groundwater Development Area

Since construction and facility maintenance would result in minor to low level impacts to mineral resources, the Proposed Action and Alternatives A through F would add incremental minor to low level effects to other cumulative actions in the project study area.

Groundwater Pumping

As indicated in Section 3.3, Water Resources, cumulative groundwater drawdown effects in Spring Valley are dominated by the varying drawdown rates and volumes among the various GWD Project alternatives. With the exception of Alternative D, all pumping alternatives would develop groundwater throughout the length of Spring Valley. The Proposed Action and Alternative B would potentially extract the largest groundwater volumes in Spring Valley, followed by Alternatives A, D, E, and F. Due to its intermittent pumping, Alternative C would potentially extract the least groundwater. No specific mining proposals are included in the list of reasonably foreseeable projects in this EIS. Depending on the location of a future mining project, the proposed points of diversion for mining project water supply wells could be located over the GWD Project aquifer drawdown areas. As a consequence, mine water supply well depths likely would be greater than they would be in the absence of the GWD Project. Conversely, if a new mine development requires dewatering, ongoing pumping from the aquifer to be dewatered may be beneficial to mine operations. It should be noted that any new mining proposals would also have to obtain existing or be permitted new water rights in these basins by the NSE, and that currently no such proposals have been identified.

3.12 Rangelands and Grazing

3.12.1 Affected Environment

3.12.1.1 Overview

Grazing allotments are the geographical management units used to characterize rangelands and grazing. The location of grazing allotments in relation to the project's proposed ROWs, groundwater development areas, and the water resources region of study (hydrologic model boundary) is shown in **Figure 3.12-1** (grazing allotment numbers in the figure are arbitrary and only intended to isolate individual allotments for locational clarification). Depending on the specific allotment and types of rangeland contained therein, livestock grazing may involve winter or spring sheep grazing, seasonal cattle grazing, or in some cases, year-round cattle grazing. Year-round grazing most commonly occurs on allotments involving a wide elevation range and diversity of vegetation types where livestock can move to higher elevations within the same allotment during the summer. Some allotments involve combinations of sheep and cattle grazing. Winter and spring grazing tend to be more prevalent in the lower elevation desert areas while summer and fall grazing predominate on allotments with a greater proportion of higher elevation areas. Because of the limited amount of available surface water over this large area, spring flows, perennial streams, and vegetation supported by springs and perennial streams are important to ranching operations and utilized by livestock during the grazing season.

QUICK REFERENCE

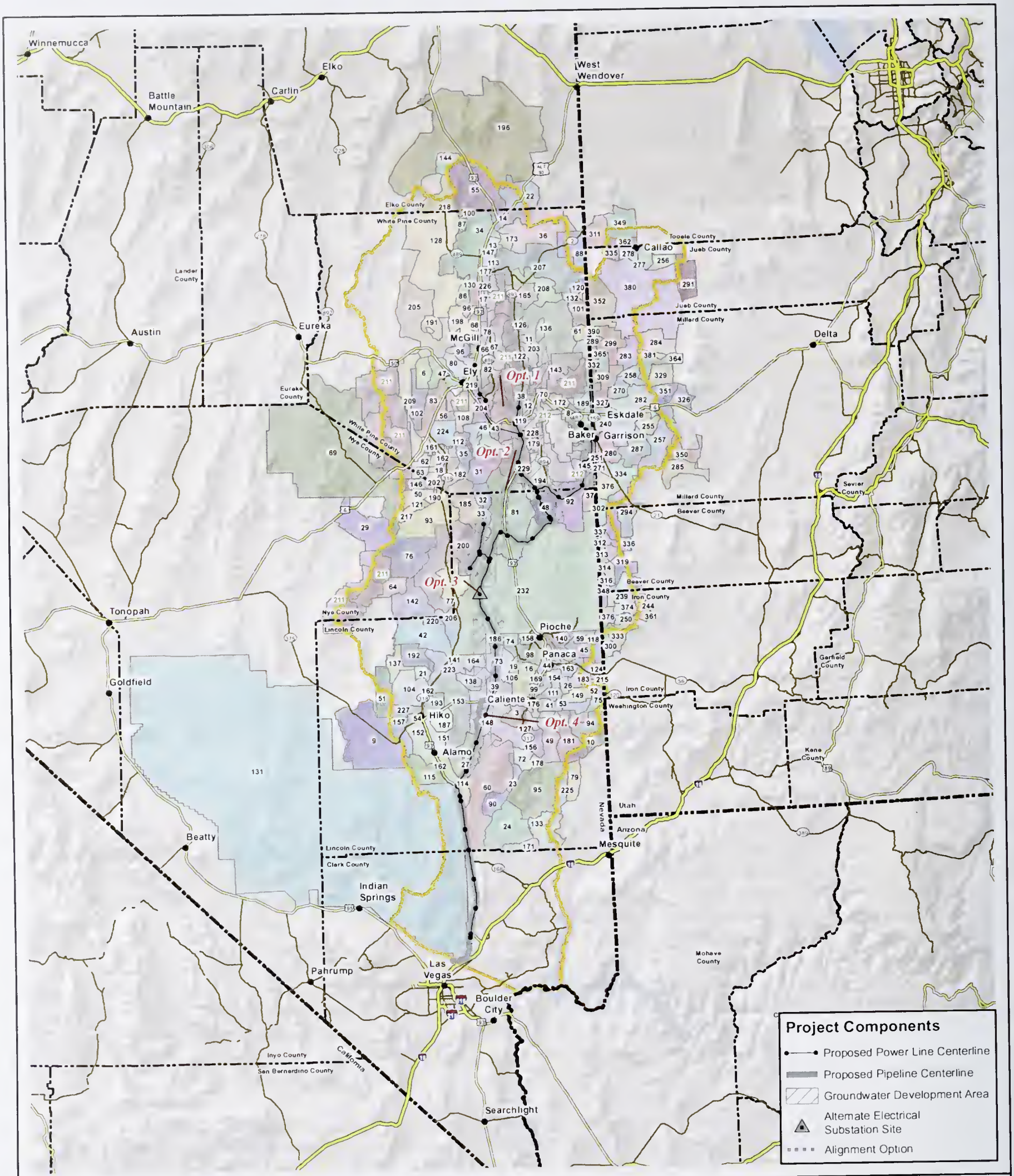
ACM – Applicant Committed Protection Measures
ET – Evapotranspiration
GIS – Global Information System
POD – Plan of Development
RMP – Resource Management Plan
ROW – Right-of-way

3.12.1.2 Right-of-way Areas

Areas of forage within the ET units are very important components of grazing allotments due to their disproportionately high ability to provide forage for livestock grazing. ET units represent primary cover types that were originally mapped as vegetation density classes and not species types. There are two cover types that make up ET units; wetland/meadow and basin shrubland vegetation. Wetland/meadow vegetation consists of perennial grasses, sedges, and rushes that are typically spring-fed or sub-irrigated meadows. They tend to "green up" early in the spring and be highly palatable and productive sources of forage for livestock. Basin shrubland vegetation consists of a variety of plant community types, but is dominated by greasewood, low saltbrush, big sagebrush, and other shrub species. In general, shrub species provide good forage for livestock throughout the winter when other sources of forage are dormant. For more information on wetland/meadow and basin shrubland vegetation types, see Section 3.5, Vegetation Resources. The allotments shown in **Table 3.12-1** contain forage consisting of either basin shrubland and/or wetland meadow vegetation. The table also presents the acreage of these vegetation types that occur within the footprint of the ROWs and ancillary facilities by alternative.

Table 3.12-2 identifies the grazing allotments and the ROW and ancillary facility footprint for the Proposed Action. Surface disturbance potentially could occur in the 14 basins in which project facilities are planned. Twenty-three allotments intersect the ROWs and ancillary facilities. The footprint associated with the ROWs equals 10,544 acres.

The specific allotments and the acreage within the ROW and ancillary facilities area are shown in **Table 3.12-2**.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

Table 3.12-1 Acres of Wetland/Meadow and Basin Shrubland Vegetation within the Right-of-way

	Proposed Action, Alternatives A through C	Alternative D (LCCRDA-only)	Alternatives E and F (Spring/Delamar, Dry Lake, and Cave)	Alignment Option 1 (Humboldt -Toiyabe Power Line)	Alignment Option 2 (North Lake Valley)	Alignment Option 3 (Muleshoe Substation)	Alignment Option 4 (North Delamar Valley Pipeline)
Allotment Name							
NV - Baker Creek - 10125	34	0	0	34	34	34	34
NV - Geyser Ranch - 01101	170	170	170	170	3	170	170
Hamlin Valley	15	0	0	15	15	15	15
NV - Oak Springs - 01050	48	48	48	48	48	48	48
Tamberlaine - 00901	1	0	1	1	1	0	1
Willow Springs - 10129	14	0	14	14	14	14	14
Total	**282**	**218**	**233**	**282**	**115**	**281**	**282**

Table 3.12-2 Grazing Allotments and Associated Acreage Intersecting the Rights-of-way and Ancillary Facilities for the Proposed Action

Allotment Name and Number	Acreage within ROW
Baker Creek - 10125	491
Buckhorn - 21012	618
Cave Valley Ranch - 00904	63
Cleveland Ranch - 01119	12
Cliff Springs - 21016	289
Cold Spring - 00909	68
Cottonwood - 00132	467
Delamar - 01083	560
Ely Springs - 11029	430
Geyser Ranch - 01101	722
Hamlin Valley - 00133	631
Lower Lake East - 21022	563
Majors - 10126	713
North Chokecherry - 20134	149
Oak Springs - 01050	767
Shingle Pass - 00906	103
Simpson - 21004	127
South Spring Valley - 10130	639
Sunnyside - 21023	514
Tamberlaine - 00901	143
West Schell Bench - 00433	115
Willow Springs - 10129	555
Wilson Creek - 01201	1,805
Total Acres within the area of the ROWs and Ancillary Facilities	**10,544**

3.12.1.3 Groundwater Development Areas

Groundwater development areas represent the acreage of the allotment within development areas by hydrologic basin. The total footprint associated with the development areas equals 729,957 acres. Within that footprint, approximately 144 to 174 wells would be developed with an associated permanent cover type conversion of 2,374 to 5,536 acres and temporary cover type conversion of 1,216 to 2,874 acres.

Within the region of study (defined by the boundary analyzed for hydrologic resources), 3,456 springs and 1,197 miles of perennial streams are located on grazing allotments.

There are 41 allotments in Nevada that intersect the groundwater development areas. The specific allotments and associated acreage within the groundwater development areas are shown in **Table 3.12-3**.

Table 3.12-3 Grazing Allotments and Associated Acreage within the Groundwater Development Areas

Allotment Name and Number	Acreage within Groundwater Development Area
NEVADA	
Baker Creek - 10125	30,330
Bassett Creek - 10114	2,405
Bastian Creek - 10121	13,626
Buckhorn - 21012	21,692
Cave Valley Ranch - 00904	3,715
Cave Valley Seeding - 00908	757
Chokecherry - 10131	7,663
Cleveland Ranch - 01119	10,490
Cliff Springs - 21016	10,483
Cottonwood - 00132	37,206
Delamar - 01083	16,843
Ely Springs - 11029	21,851
Ely Springs Sheep - 21030	2,874
Fox Mountain - 11001	4
Geyser Ranch - 01101	7,743
Hamlin Valley - 00133	21,137
Majors - 10126	67,365
Mccoy Creek - 10135	5,133
Meadow Creek - 10113	5,013
Muncy Creek - 20111	40,315
Mustang - 01047	5,397
Negro Creek - 00120	17,959
North Chokecherry - 20134	8,288
Oak Springs - 01050	49,834
Pahroc - 01052	480
Rattlesnake - 01058	11,393
Red Hills - 00108	19
Scotty Meadows - 10128	16,117

Table 3.12-3 Grazing Allotments and Associated Acreage within the Groundwater Development Areas (Continued)

Allotment Name and Number	Acreage within Groundwater Development Area
Shingle Pass - 00906	4,840
Simpson - 21004	2,671
Smith Creek - 20117	36,412
South Spring Valley - 10130	68,289
Stephens Creek - 10118	2,935
Sunnyside - 21023	25,116
Taft Creek - 10116	3,828
USFS – 00417 - 00432	238
USFS – 00433 - 00434	9
USFS – 00435 - 00442	325
Willard Creek - 10127	8,649
Willow Springs - 10129	46,896
Wilson Creek - 01201	93,614
Total Acres within the Groundwater Development Areas	**729,957**

The exact location of well development facilities is undefined at this project stage, although SNWA has provided estimates of well numbers and surface disturbance by basin in their POD. **Table 3.12-4** shows the estimated surface disturbance for the groundwater development areas. For the Proposed Action, the well locations would be optimized based on groundwater modeling and test results. Additional NEPA analysis (NEPA subsequent tiers) will be required to address specific well locations and collector pipelines.

Table 3.12-4 Acres of Groundwater Development Area Surface Disturbance Assumptions

Assumptions	Proposed Action	Alternatives A and C	Alternative B	Alternative D	Alternative E	Alternative F
Total Construction Disturbance Area (temporary and permanent)	3,590 – 8,410	2,069 – 4,814	4,664	2,513 – 4,005	1,754 – 4,079	2,698 – 6,629
Temporary Disturbed Area to be revegetated	1,216 – 2,874	669 – 1,643	1,587	858 – 1,370	595 – 1,396	916 – 2,270
Permanent Disturbance	2,374 – 5,536	1,370 – 3,171	3,077	1,655 – 2,635	1,158 – 2,683	1,782 – 4,359

3.12.1.4 Region of Study

The region of study for rangeland and livestock grazing corresponds to the boundary associated with the water resources region of study (**Figure 3.12-1**). Within the region of study, GIS analysis has identified 298 grazing allotments.

The allotments shown in **Table 3.12-5** contain forage (categorized as ET units) consisting of wetland/meadow and/or basin shrubland vegetation types (see Section 3.12.1.2 and Section 3.5, Vegetation Resources, for more information regarding wetland/meadow and basin shrubland vegetation types). The acres that occur within the footprint of the groundwater development areas in those allotments also are shown. These acreages are being evaluated due to their disproportionately high ability to provide forage for livestock grazing and their susceptibility to stress related to soil moisture fluctuation. Although other vegetation types contained within these allotments are also important for livestock

grazing, they are less susceptible to the effects of groundwater drawdown due to differences in plant rooting depth and drought tolerance, and therefore, would be less affected by groundwater development.

Table 3.12-5 Acres of Wetland/Meadow and Basin Shrubland Vegetation within the Groundwater Development Areas

Allotment Name and Number	Proposed Action, Alternatives A through C	Alternative D - LCCRDA-only	Alternatives E and F – Spring/Delamar, Dry Lake, and Cave
NEVADA	**Acreage within Groundwater Development Areas**		
Baker Creek - 10125	3,019		
Bassett Creek - 10114	55		55
Bastian Creek - 10121	11,071		11,071
Chokecherry - 10131	6,149		
Cleveland Ranch - 01119	1,420		1,420
Hamlin Valley - 00133	3,320		
Majors - 10126	9,083		9,083
Mccoy Creek - 10135	22		22
Meadow Creek - 10113	822		822
Muncy Creek - 20111	2,535		2,535
Negro Creek - 00120	1,805		1,805
North Chokecherry - 20134	228		
Scotty Meadows - 10128	12,139		12,139
Smith Creek - 20117	5,583		
South Spring Valley - 10130	17,323		17,323
Stephens Creek - 10118	1,069		1,069
Sunnyside - 21023	7,975	7,975	7,975
Taft Creek - 10116	947		947
Willard Creek - 10127	2,358		2,358
Willow Springs - 10129	16,665		16,665
UTAH	**Acreage within Groundwater Development Areas**		
Baker - 04305	262		
Burbank - 04299	2		
Out - 999	4		
Smith Creek - 04335	81		
Stateline - 06238	2		
Unalloted - 09999	6		
Total	**103,945**	**7,975**	**85,289**

As indicated in Section 3.3, Water Resources, the largest number of springs and streams generally flow in valleys bounded by large mountain ranges. However, numerous springs and streams occur in high-elevation upland areas throughout much of the region. Perennial flow in these upland springs and streams is generally controlled by discharge from localized or perched groundwater sources that are not hydraulically connected to the regional groundwater system (see Section 3.3, Water Resources). The estimate of the number and extent of springs within the grazing allotment boundaries in the water resources region of study (**Table 3.12-6)** was obtained from GIS analysis. Within the region of

study, 3,456 springs and 1,076 miles of perennial streams are located on grazing allotments. As some private lands also may occur within the grazing allotments, some springs accounted for in the table could occur on private land.

Table 3.12-6 Water Sources in the Bureau of Land Management Livestock Allotments at Least Partially within the Region of Study

Hydrologic Basin	Perennial Streams (Miles)	Springs (Numbers)
Black Mountains Area	10	16
Butte Valley (Southern Part)	16	45
California Wash	8	0
Cave Valley	9	48
Clover Valley	18	27
Coal Valley	0	7
Coyote Spring Valley	<1	13
Delamar Valley	0	31
Dry Lake Valley	<1	100
Dry Valley	8	12
Eagle Valley	6	11
Fish Springs Flat	<1	2
Garden Valley	16	43
Hamlin Valley	10	166
Jakes Valley	11	11
Kane Springs Valley	<1	9
Lake Valley	16	66
Las Vegas Valley	11	96
Long Valley	<1	3
Lower Meadow Valley Wash	60	52
Lower Moapa Valley	20	1
Muddy River Springs Area	7	27
Pahranagat Valley	33	19
Pahroc Valley	13	3
Panaca Valley	8	20
Patterson Valley	3	28
Pleasant Valley	<1	65
Rose Valley	0	1
Snake Valley	166	450
Spring Valley (184)	283	670
Spring Valley (201)	28	102
Steptoe Valley	231	1,009
Tippett Valley	2	30
White River Valley	83	273

BIO-WEST (2007) conducted an evaluation of selected springs in Snake and Spring valleys, and as part of that evaluation, noted springs that exhibited signs of livestock use and/or were modified with diversions. The following named springs (presented in alphabetical order) show evidence of extensive use by livestock and/or wildlife and wild

horses. Of 28 spring sites surveyed in Snake Valley, diversion structures were present at 15; of 25 spring sites surveyed in Spring Valley, diversion structures were present at 15 (BIO-WEST 2007). Big Springs in Snake Valley is the only spring surveyed where a residence has been constructed nearby.

Snake Valley – Big Springs, Big Springs Pond, Big Springs Creek, North Beck Spring, South Beck Spring, Bishop Springs/Foote Reservoir, Caine Spring, Callao Big Spring, Clay Spring, Cold Spring, Gandy Salt Marsh (6 sites), Gandy Warm Springs, Knoll Spring, Leland Harris Spring, Miller Spring, North Little Spring, South Little Spring, Swimming Hole, Twin Springs, unnamed Big Spring #1, unnamed Big Spring #2, unnamed spring south of Caine Spring, unnamed spring south of Knoll Spring, and unnamed spring at Skating Pond.

Spring Valley – Blind Spring, Cedars Spring, Keegan Ranch North, Keegan Ranch Middle, Keegan Ranch South, Layton Spring, North Millick Spring, South Millick Spring, Shoshone Ponds (3 sites), South Bastion Spring, Swallow Spring, Turnley/Woodsman, unnamed springs east of Cleve Creek (2 sites), unnamed Minerva springs (3 sites), unnamed Stonehouse complex, unnamed spring (1 site), West Spring Valley Complex (2 sites), Willard Spring, and Willow Spring.

3.12.2 Environmental Consequences

3.12.2.1 Rights-of-way

Issues

Construction and Facility Maintenance

- Temporary reduction of grazing forage production due to surface disturbance. Permanent reduction of grazing forage production due to permanent surface disturbance for roads and facilities.
- Reduction of allotment carrying capacity resulting from surface disturbance.
- Loss of, or injury to, livestock due to open trenches and fences.
- Effects to livestock movement due to staging of pipeline and power line equipment.
- Impacts to rangeland improvements.
- Animal-vehicle collisions.

Assumptions

The following assumptions were used in the impact analysis for rangelands and livestock grazing:

- Current grazing allotment carrying capacities are appropriate and reflect the desired level for the present and foreseeable future of the affected allotments.
- Short-term impacts are defined as less than 2 years. Long-term impacts are defined as greater than 2 years. Permanent impacts assume that the land will not be reclaimed or returned to its previous use.
- In situations where the Las Vegas RMP does not specify management actions related to range management and livestock grazing, the actions described in the Ely RMP will be used.

Methodology for Analysis

For the impact analysis study, impact parameters were used as both an indication of impacts and as a means of quantifying impacts. The water resources region of study boundary is used for analysis of these impacts as water is the limiting factor for livestock health. These parameters also allowed for comparison between alternatives or groups of alternatives.

To quantify impacts to grazing allotments, potential reductions to vegetation communities were evaluated. SSURGO data was used to identify NRCS ecological site descriptions. The dominant plant species associated with the soil map units for each ecological site descriptions were used to represent the vegetation community type. ROW surface disturbances are measured in terms of acreage impacts to the various vegetation communities. Impact parameters for rangelands and livestock grazing include the following:

- Determine number of grazing allotments located within the pipeline and power line ROWs, based on GIS information and the Ely RMP.
- Estimate change to livestock forage production and management in grazing allotments based on short- and long-term surface disturbances.
- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect rangeland resources from ROW construction and operation activities. ROW construction activities would result in surface disturbances that would require restoration and subsequent monitoring and evaluation of success. Rangeland resources would be monitored for noxious weeds and successful establishment of

desired grass, forb, and shrub species. The COM Plan would be used to monitor all of the impacts discussed in Section 3.12.2.

3.12.2.2 Proposed Action and Alternatives A through C

Construction and Facility Maintenance

Reduction of Rangeland Carrying Capacity

Temporary surface disturbance areas consist of the pipeline and power line ROWs and construction support areas. A total of 10,544 acres affecting 23 allotments would be disturbed resulting in long-term reductions in grazing forage production. Impacts to vegetation communities within the affected allotments are shown in **Table 3.12-7**. The reclamation process could take 4 or more years after construction is complete, based on the restoration of disturbed soils and vegetation (Hoover 2009). Revegetation of disturbed ROW areas may be delayed, or may not succeed in areas of intensive seasonal livestock use. Examples of these areas include the vicinity of surface water sources including riparian vegetation areas and bed grounds. To improve the likelihood of revegetation success in this area, temporary fencing may be erected to protect these sensitive areas, while insuring livestock movement. Areas where the BLM determines that fencing is necessary to protect reclamation success will be developed per BLM policy. If large sections of pastures are fenced the fence will be built according to BLM design standards and will allow for wildlife and livestock movement and access. If it is determined that the entire pasture needs to be closed to achieve reclamation standards, the permittee may be compensated per BLM policy. These areas would be closed for two growing years or until BLM determines that reclamation meets BLM BMP standards (see Mitigation Measure ROW-GRA-1). The COM Plan, which would include the incorporation of the Reclamation Plan, would be developed and implemented to monitor the success of vegetation reclamation for all project related surface disturbing activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

To provide opportunities to improve overall revegetation success, and stabilize sensitive soils, ROW–GRA-1 would be implemented.

Table 3.12-7 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Proposed Action and Alternatives A through C

Allotment Name/Size (acres)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Baker Creek - 10125 / 58,720	491 / 1%	R028AY013NV	Black sagebrush - *Artemisia nova*	170	35
		R028AY013NV	Galleta - *Pleuraphis jamesii*	73	15
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	143	29
		R028AY012NV	Indian ricegrass - *Achnatherum hymenoides* / Shadscale - *Atriplex confertifolia*	42	9
		R028AY015NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	36	5
		R028BY074NV	Shadscale - *Atriplex confertifolia*/Black greasewood - *Sarcobatus vermiculatus*	27	5

Table 3.12-7 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Proposed Action and Alternatives A through C (Continued)

Allotment Name/Size (acres)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Buckhorn - 21012 / 80,664	618 / 1%	030XB001NV_1	Black sagebrush - *Artemisia nova*	19	3
		R029XY079NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	3	<1
		R029XY085NV	Desert needlegrass - *Achnatherum speciosum*	30	5
		R030XB010NV	Galleta - *Pleuraphis jamesii*	39	6
		029XY017NV_3	Indian ricegrass - *Achnatherum hymenoides* / Shadscale - *Atriplex confertifolia*	109	18
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Spiny Hopsage - *Grayia spinosa*	92	15
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	198	32
		R029XY059NV	Shadscale - *Atriplex confertifolia*	59	10
		R029XY079NV	Unidentified	69	10
Cave Valley Ranch - 00904 / 38,585	63 / <1%	R028AY015NV	Indian ricegrass - *Achnatherum hymenoides* / Desert needlegrass - *Achnatherum speciosum*	63	100
Cleveland Ranch - 01119 / 16,749	12 / <1%	R028AY013NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	12	100
Cliff Springs - 21016 / 32,964	289 / 1%	R029XY079NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	3	1
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Desert needlegrass - *Achnatherum speciosum*	43	15
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Spiny hopsage - *Grayia spinosa*	134	46
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	109	38

Table 3.12-7 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Proposed Action and Alternatives A through C (Continued)

Allotment Name/Size (acres)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Cold Spring - 00909 / 13,102	68 / <1%	R028BY008NV	Indian ricegrass - *Achnatherum hymenoides*	5	7
		R028BY080NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	4	6
		F028BY060NV	Wyoming big sagebrush - *Artemisia tridentata*	5	7
		R028BY070NV R028BY011NV	Unidentified	54	80
Cottonwood - 00132 / 49,964	467 / 1%	R028AY013NV R028AY015NV	Black sagebrush - *Artemisia nova*	281	60
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	10	2
		R028AY027NV	Littleleaf mountain mahogany - *Cercocarpus intricatus*	8	2
Cottonwood (Continued)		R028AY030NV	Winterfat - *Krascheninnikovia lanata*	6	1
		R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	162	35
Delamar - 01083 / 165,499	560 / <1%	030XB019NV_2	Black sagebrush - *Artemisia nova*	50	9
		030XB019NV_2	Creosotebush - *Larrea tridentata*	152	27
		030XB019NV_1	Indian ricegrass - *Achnatherum hymenoides*	266	47
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	4	1
		030XB005NV_4	White bursage - *Ambrosia dumosa*	88	16
Ely Springs - 11029 / 57,849	430 / 1%	R029XY042NV R029XY046NV	Indian ricegrass - *Achnatherum hymenoides*	340	79
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	3	<1
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	14	3
		R029XY059NV	Shadscale - *Atriplex confertifolia* / Winterfat - Krascheninnikovia lanata	20	5
		R029XY042NV	Winterfat - *Krascheninnikovia lanata*	53	12

Table 3.12-7 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Proposed Action and Alternatives A through C (Continued)

Allotment Name/Size (acres)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Geyser Ranch - 01101 / 247,746	722 / <1%	R028AY043NV	Basin wildrye - *Leymus cinereus* / Bluebunch wheatgrass - *Pseudoroegneria spicata*	136	19
		R028AY008NV	Black greasewood - *Sarcobatus vermiculatus*	58	8
		R028AY050NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	12	2
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	83	12
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	29	4
		R028AY015NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Atremisia tridentata*	47	7
Geyser Ranch (Continued)		R028AY015NV 028AY008NV_1 R028AY001NV	Wyoming big sagebrush - *Artemisia tridentata*	357	50
Hamlin Valley - 00133 / 106,621	631 / <1%	R028AY013NV R028AY015NV R028AY004NV	Black sagebrush - *Artemisia nova*	24	4
		R028AY013NV	Galleta - *Pleuraphis jamesii*	28	4
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	576	91
		R028AY027NV	Littleleaf mountain mahogany - *Cercocarpus intricatus*	3	<1
Lower Lake East - 21022 / 52,550	563 / 1%	030XB019NV_2	Black sagebrush - *Artemisia nova*	76	14
		R030XB006NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	35	6
		R030XB019NV	Creosotebush - *Larrea tridentata*	134	24
		R029XY085NV	Desert needlegrass - *Achnatherum speciosum*	104	19
		R030XB010NV 030XB029NV_1	Galleta - *Pleuraphis jamesii*	62	11
		030XB019NV_1	Indian ricegrass - *Achnatherum hymenoides*	102	18
		R030XB006NV	Indian ricegrass - *Achnatherum hymenoides* / Shadscale - *Atriplex confertifolia*	39	7
		030XB029NV_1 R029XY022NV	Unidentified	11	2

Table 3.12-7 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Proposed Action and Alternatives A through C (Continued)

Allotment Name/Size (acres)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Majors - 10126 / 103,533	713 / 1%	R028AY013NV R028AY004NV	Black sagebrush - *Artemisia nova*	102	14
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	85	12
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	334	47
		R028BY013NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	43	6
		F028BY058NV R028AY017NV R028AY015NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	51	7
		F028BY060NV R028AY013NV	Wyoming big sagebrush - *Artemisia tridentata*	98	14
North Chokecherry - 20134 / 8,745	149 / 2%	R028AY013NV	Black sagebrush - *Artemisia nova*	37	25
		R028AY013NV	Galleta - *Pleuraphis jamesii*	82	55
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	30	20
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	30	20
Oak Springs - 01050 / 191,412	767 / <1%	R029XY079NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	122	16
		R029XY006NV	Indian ricegrass - *Achnatherum hymenoides*	35	5
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Desert needlegrass - *Achnatherum speciosum*	211	28
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Spiny hopsage - *Grayia spinosa*	68	9
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	69	9
		R029XY049NV 029XY049NV_2	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	96	13
		R029XY008NV	Low sagebrush - *Artemisia arbuscula*	25	3
		029XY010NV_3	Wyoming big sagebrush - *Artemisia tridentata*	5	<1
		R029XY079NV	Unidentified	136	18

Table 3.12-7 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Proposed Action and Alternatives A through C (Continued)

Allotment Name/Size (acres)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Shingle Pass - 00906 / 75,280	103 / <1%	R028AY030NV	Winterfat - *Krascheninnikovia lanata*	26	25
		R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	77	75
Simpson - 21004 / 8,088	127 / 2%	R029XY059NV	Shadscale - *Atriplex confertifolia* / Winterfat - Krascheninnikovia lanata	127	100
South Spring Valley - 10130 / 84,624	639 / 1%	028AY121NV_1	Basin wildrye - *Leymus cinereus*	48	8
		R028AY013NV	Black sagebrush - *Artemisia nova*	40	6
		R028AY013NV	Galleta - *Pleuraphis jamesii*	95	15
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	198	31
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	46	7
South Spring Valley (Continued)		R028AY015NV R028AY017NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	157	25
		R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	55	9
Sunnyside - 21023 / 72,094	514 / 1%	R029XY008NV	Black sagebrush - *Artemisia nova*	107	21
		R028AY015NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	6	1
		R028AY030NV	Winterfat - *Krascheninnikovia lanata*	47	9
		R028AY015NV R028AY001NV	Wyoming big sagebrush - *Artemisia tridentata*	354	69
Tamberlaine - 00901 / 36,839	143 / <1%	R028BY011NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	14	10
		R028AY015NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	66	46
		R028BY011NV	Unidentified	63	44

Table 3.12-7 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Proposed Action and Alternatives A through C (Continued)

Allotment Name/Size (acres)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
West Schell Bench - 00433 / 50,279	115 / <1%	R028BY011NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	19	17
		R028BY086NV	Wyoming big sagebrush - *Artemisia tridentata*	26	23
		R028BY011NV R028BY089NV	Unidentified	70	61
Willow Springs - 10129 / 85,708	555 / 1%	028AY121NV_1	Basin wildrye - *Leymus cinereus*	39	7
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	178	32
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	187	34
		R028AY015NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	151	27
Wilson Creek - 01201 / 567,448	1805 / <1%	R029XY008NV R028AY013NV R028AY015NV	Black sagebrush - *Artemisia nova*	276	15
		R028AY050NV	Bluebunch wheatgrass - *Psendoroegneria spicata*	82	5
		029XY049NV_2	Indian ricegrass - *Achnatherum hymenoides*	246	13
		R029XY008NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	94	5
		R028AY015NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	94	5
		R029XY046NV R029XY059NV	Shadscale - *Atriplex confertifolia* / Winterfat - Krascheninnikovia lanata	118	7
		R029XY046NV R029XY159NV R029XY020NV	Winterfat - *Krascheninnikovia lanata*	345	19
		R028AY013NV R028AY015NV R028AY001NV	Wyoming big sagebrush - *Artemisia tridentata*	521	29
		R029XY046NV R028AY088NV	Unidentified	29	2

[1] Unidentified plant communities are due to soil data gaps and incomplete ecological site surveys.

There is the risk that halogeton or other invasive plants could invade the ROW disturbed areas and hamper the establishment of quality forage species. Invasive vegetation degrades quality forage in several ways. Weeds out compete most native plants and can lead to a homogeneous vegetative landscape. Weedy habitats often contain fewer highly nutritious forage species for grazers. The potential for invasive vegetation that is currently occurring to spread, and for new invasive species to be introduced, would be highest along the linear features (e.g., roads, pipeline system). However, this risk would be offset by ACMs for weed treatment (A.1.82 through A.1.89).

Permanent surface disturbances would consist of access roads and aboveground facilities. A total of 708 acres affecting 18 allotments would have a permanent reduction in rangeland carrying capacity. **Table 3.12-8** gives a breakdown of permanent facility-related surface impacts by grazing allotment.

During the reclamation process, 9,836 acres of the total disturbance area would be reclaimed to a productive condition. This recovery process would be long-term and would initially reduce the carrying capacity of grazing forage.

Maintenance activities for operational facilities are unlikely to have additional impacts to rangelands and livestock grazing, since they would be conducted in areas already described as permanently disturbed. If maintenance or repair activities require additional ROWs, prior approval would be obtained from the BLM.

All construction and maintenance activities have the potential to reduce forage production and palatability due to the deposition of fugitive dust particles around areas of construction and along unpaved roads. The effect of dust deposition on livestock grazing can vary depending on factors such as soil type, wind, frequency, and timing of precipitation events, and the availability of palatable vegetation elsewhere within the affected allotments. These effects would be offset by ACMs for air quality (A.10.1, A.10.2, A.10.4, and A.10.6 through A.10.8).

Table 3.12-8 Aboveground Facility Permanent Impacts by Grazing Allotment, Proposed Action and Alternatives A through C

Project Facility	Basin	Allotment	Impacted Acreage
Access Road	Cave Valley	NV - Sunnyside - 21023	20
	Coyote Spring Valley	NV - Delamar - 01083	39
		NV - Lower Lake East - 21022	15
	Delamar Valley	NV - Buckhorn - 21012	42
		NV - Oak Springs - 01050	30
	Dry Lake Valley	NV - Cliff Springs - 21016	25
		NV - Ely Springs - 11029	35
		NV - Oak Springs - 01050	23
		NV - Simpson - 21004	11
		NV - Wilson Creek - 01201	88
	Lake Valley	NV - Geyser Ranch - 01101	24
		NV - Wilson Creek - 01201	26
	Pahranagat Valley	NV - Buckhorn - 21012	<1
	Snake Valley	NV - Baker Creek - 10125	36
	Spring Valley	NV - Cleveland Ranch - 01119	1
		NV - Majors - 10126	62
		NV - South Spring Valley - 10130	14
		NV - Willow Springs - 10129	34
		NV - Wilson Creek - 01201	14
	Steptoe Valley	NV - Cold Spring - 00909	8
		NV - Majors - 10126	<1
		NV - Tamberlaine - 00901	11

Table 3.12-8 Aboveground Facility Permanent Impacts by Grazing Allotment, Proposed Action and Alternatives A through C (Continued)

Project Facility	Basin	Allotment	Impacted Acreage
Eleetrieal Substation Site - Primary	Dry Lake Valley	NV - Oak Springs - 01050	10
	Spring Valley	NV - South Spring Valley - 10130	45
Electrical Substation Site - Seeondary	Cave Valley	NV - Sunnyside - 21023	1
	Coyote Spring Valley	NV - Lower Lake East - 21022	7
	Snake Valley	NV - Baker Creek - 10125	1
	Spring Valley	NV - Majors - 10126	1
		NV - Willow Springs - 10129	1
Pressure Reducing Station	Coyote Spring Valley	NV - Lower Lake East - 21022	7
	Dry Lake Valley	NV - Wilson Creek - 01201	4
Pumping Station Site	Lake Valley	NV - Geyser Ranch - 01101	5
	Snake Valley	NV - Baker Creek - 10125	15
	Spring Valley	NV - Majors - 10126	5
		NV - South Spring Valley - 10130	30
Regulating Tank Site	Delamar Valley	NV - Buekhorn - 21012	5
	Dry Lake Valley	NV - Oak Springs - 01050	5
		NV - Wilson Creek - 01201	4
	Hamlin Valley	NV - Hamlin Valley - 00133	2
	Lake Valley	NV - Geyser Raneh - 01101	2

Conclusion. Acreage and forage production in the grazing allotments crossed by the ROWs would be disturbed. The reclamation would take more than 2 years to complete; therefore, this would be considered a long-term impact. ACMs for weed treatment would help to ensure that the vegetation restoration is completed in a timely manner and that invasive weed species are controlled to the extent possible. There may be a short-term loss of forage production and/or quality due to dust deposition. ACMs related to air quality would reduce the dust-related effects.

Proposed mitigation measures:

ROW-GRA-1: Temporary Fencing or Closure In Livestock Use Areas. The SNWA would conduct pre-construction surveys to determine areas of livestock use in and adjacent to the construction ROW where application of temporary fencing or closure would be needed for revegetation species establishment. The results of these surveys would be provided to the BLM for review and approval. Reseeded areas that are temporarily fenced or closed would be monitored by the SNWA on a yearly basis until the BLM determines that reseeded areas are self-sustaining, and fencing removed. The time frame for reclamation monitoring is a minimum of two growing years or until the BLM determines that reclamation meets BLM BMP standards. Effectiveness: Temporary fencing or closure would be effective in improving the stabilization and persistence of reseeded areas in the short-term. In the long-term, annual precipitation from year to year, and the seasonal distribution of livestock within the allotment would determine the survival of reseeded plants. Effects on other resources: Temporary fencing would also limit wild horse access to forage inside fenced areas. Big game species would not likely be deterred by temporary livestock fencing. Temporary fencing in riparian areas could improve the recovery rate of shrubs and herbs that assist in stabilizing channel banks.

ROW-AQ-2: **Alternative Dust Control Measures**. Areas where soil tackifiers are prohibited (e.g., threatened and endangered species habitat, perennial stream drainages) would be determined in cooperation with the BLM and the USFWS prior to construction, and identified in both the Construction and Mitigation Plans. Other mitigation (e.g., gravel application) may be required to reduce impacts and to ensure protection of public safety. This measure would supplement SNWA ACM A.10.3.

ROW-VEG-3: Green Stripping. SNWA, in consultation with the BLM, would develop a green stripping revegetation prescription where BLM and SNWA preventive and control measures may be inadequate to mitigate risks of weed invasion and wildfire. Green stripping is defined as ROW revegetation with fast-growing herbaceous species that can outcompete annual and perennial weeds and can provide a green firebreak. Locations where this measure may be applied would be identified in the Restoration Plan, Integrated Weed Management Plan, and Fire Prevention Plan, and approved by the BLM Visual Resource Management Coordinator. For example, it would be applied primarily to Great Basin Desert low elevation bottomlands, with limited applications to open evergreen woodlands (due to low risk for weed invasion) and Mojave Desert lowlands (due to low risk as a fire disturbance ecosystem).

GW-WL-1: Avoid Siting Facilities in Key Big Game Habitats. Avoid locating wells, new roads, or other linear facilities within key big game habitats including crucial summer and winter ranges, and occupied bighorn sheep habitats. Where avoidance is not practicable, the SNWA would improve 2 acres of comparable habitat for every 1 acre disturbed.

Residual impacts include:

- Short-term loss of forage production and/or quality due to dust deposition as a result of construction and maintenance activities.
- Long-term disturbance in grazing allotments crossed by the GWD Project ROWs. In addition, permanent disturbance would occur in areas where permanent facilities are constructed. Long-term loss of forage production would occur due to surface disturbance of 10,544 acres within project ROWs.
- Long-term potential for a reduction of forage production and/or quality due to the establishment of invasive weedy species.

Injury to Livestock

Open trenches during construction could result in low level impacts to animals from injury or mortalities. ACM A.1.42 would ensure that escape ramps would be placed at either end, or at 0.25-mile intervals in unfenced trenches deeper than 1 foot to allow animals to escape. During this time, staging areas may be enclosed with temporary security fences, which should reduce the potential for loss or injury of livestock. Security fencing would be 6 to 8 feet in height and would be removed once the trench has been back-filled and construction activities are completed (ACM A.1.12). As stated in ACM A.1.17, a 4-foot-high orange snow fence or similar would be used to enclose construction activities in areas where security fences are not utilized. Per management direction described in the Ely RMP FEIS/ROD, new wire fencing would be marked with white 12-inch by 1-inch flagging every 16 feet (BLM 2007).

Conclusion. There is potential for livestock to be injured or killed due to open trenches and fencing, although ACMs A.1.42, A.1.12, and A.1.17 and the guidance provided in the Ely FEIS/ROD reduce this potential impact.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term potential for livestock injury or death due to open trenches or fencing.

Livestock Movement

Pipeline construction could interfere with the normal movement of livestock due to the presence of construction personnel, open trenches, staging areas, and temporary fencing. This could result in inaccessible areas of rangeland in the short term. Results could include concentrated grazing in accessible areas and an inability to access water sources in restricted areas. ACM A.8.4 would require that alternative water sources (water troughs or similar) be made available if access to water sources is restricted.

Effects of concentrated grazing potentially would include soil compaction and overgrazed vegetation. As stated in ACM A.8.1, pre-construction coordination with the BLM and grazing permit holders would be conducted to allow for advance planning of grazing practices and ensure the best use of available rangeland.

Conclusion. Interference with normal livestock movement would be short-term. ACMs would provide adequate water supplies and protect wildlife and rangeland resources.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term potential for concentrated grazing resulting in soil compaction and overgrazed vegetation.

Range Improvements

Pipeline and power line construction would cross 23 grazing allotments. Due to the size of the project area, it is impracticable to identify all the rangeland improvements that are located within these allotments; however, all improvements would be documented prior to the start of construction activities. Temporary removal or damage to some improvements (e.g., fences, cattle guards, water sources) could occur. Any improvements that are removed or damaged would be replaced or repaired to BLM standards upon completion of construction through an allotment or pasture in order to avoid interfering with ranching operations; protocols for documenting, replacing, and repairing rangeland improvements are included in ACM A.8.2.

Conclusion. According to ACM A.8.2, preconstruction conditions would be documented and range improvements disturbed by construction activities would be restored to their previous condition upon construction completion.

Proposed mitigation measures:

None.

Residual impacts include:

- Temporary removal or destruction of rangeland improvements.

Animal-vehicle Collisions

There is potential for livestock to be injured or killed by animal-vehicle collisions, although ACM A.2.1 would reduce the potential by restricting vehicle speeds to 25 mph or less in construction areas. ACM A.8.3 specifies that property owners would be compensated at fair market value for any livestock struck by a vehicle directly associated with construction activities.

Conclusion. ACMs would adequately protect range animals from vehicles and property owners from incurring loss due to animal-vehicle collisions.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term potential for injury to livestock due to construction activities.
- Short- and long-term potential for animal-vehicle collisions due to operation and maintenance activities.

3.12.2.3 Alternative D

Construction and Facility Maintenance

Development would be eliminated in the White Pine County portion of Spring Valley. No construction and facility maintenance effects would occur north of the White Pine County line since the Spring and Snake valley laterals and associated facilities would not be constructed outside the LCCRDA corridor. In addition, fewer power line facilities would be constructed.

Reduction in Rangeland Carrying Capacity

Temporary surface disturbance areas consist of the pipeline and power line ROWs and construction support areas. A total of 7,083 acres affecting 14 allotments would be disturbed and there would be a long-term reduction in grazing forage production. Impacts to vegetation communities within the affected allotments are shown in **Table 3.12-9.** The reclamation process would take two growing years after construction is completed or until the BLM determines that reclamation meets BLM BMP standards. Areas where the BLM determines that fencing is necessary to protect reclamation success will be developed per BLM policy. If large sections of pastures are fenced the fence will be built according to BLM design standards and will allow for wildlife and livestock movement and access. If it is determined that the entire pasture needs to be closed to achieve reclamation standards, the permittee may be compensated per BLM policy (see Mitigation Measure ROW-GRA-1). The COM Plan, which would include the incorporation of the Reclamation Plan, would be developed and implemented to monitor the success of vegetation reclamation for all project related surface disturbing activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Table 3.12-9 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Alternative D

Allotment Name/Size (acres)	Surface Disturbance (acres)/Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Buckhorn - 21012 / 80,664	618 / 1%	030XB001NV_1	Black sagebrush - *Artemisia nova*	19	3
		R029XY079NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	3	<1
		R029XY085NV	Desert needlegrass - *Achnatherum speciosum*	30	5
		R030XB010NV	Galleta - *Pleuraphis jamesii*	39	6
		029XY017NV_3	Indian ricegrass - *Achnatherum hymenoides* / Shadscale - *Atriplex confertifolia*	109	18
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Spiny Hopsage - *Grayia spinosa*	92	15
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	198	32
		R029XY059NV	Shadscale - *Atriplex confertifolia*	59	10
		R029XY079NV	Unidentified	69	11
Cave Valley Ranch - 00904 / 38,585	63 / 2%	R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	63	100

Table 3.12-9 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Alternative D (Continued)

Allotment Name/Size (acres)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Cliff Springs - 21016 / 32,964	289 / 1%	R029XY079NV	Bluebunch whcatgrass - *Psendoroegneria spicata*	3	1
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Dcsert ncedlegrass - *Achnatherum speciosum*	43	15
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Spiny hopsage - *Grayia spinosa*	134	46
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	109	38
Cottonwood - 00132 / 49,964	384 / 1%	R028AY015NV	Black sagebrush - *Artemisia nova*	216	56
		R028AY030NV	Winterfat - *Krascheninnikovia lanata*	6	2
		R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	162	42
Delamar - 01083 / 165,499	560 / <1%	030XB019NV_2	Black sagebrush - *Artemisia nova*	50	9
		030XB019NV_2	Creosotebush - *Larrea tridentata*	152	27
		030XB019NV_1	Indian ricegrass - *Achnatherum hymenoides*	266	47
		030XB005NV_4	White bursage - *Ambrosia dumosa*	88	16
		Data Gap	Unidentified	4	1
Ely Springs - 11029 / 57,849	430 / 1%	R029XY042NV	Indian ricegrass - *Achnatherum hymenoides*	340	79
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	14	3
		R029XY059NV	Shadscale - *Atriplex confertifolia* / Winterfat - Krascheninnikovia lanata	20	5
		R029XY042NV	Winterfat - *Krascheninnikovia lanata*	53	12
		Data Gap	Unidentified	3	1

Table 3.12-9 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Alternative D (Continued)

Allotment Name/Size (acres)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Geyser Ranch - 01101 / 247,746	722 / <1%	R028AY043NV	Basin wildrye - *Leymus cinereus* / Bluebunch wheatgrass - *Pseudoroegneria spicata*	136	19
		R028AY008NV	Black greasewood - *Sarcobatus vermiculatus*	58	8
		R028AY050NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	12	2
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	83	11
		R028AY015NV	Indian ricegrass -*Achnatherum hymenoides* / Wyoming big sagebrush - *Atremisia tridentata*	47	7
		R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	357	49
		Data Gap	Unidentified	29	4
Lower Lake East - 21022 / 52,550	563 / 1%	030XB019NV_2	Black sagebrush - *Artemisia nova*	76	13
		R030XB006NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	35	6
		R030XB019NV	Creosotebush - *Larrea tridentata*	134	24
		R029XY085NV	Desert needlegrass - *Achnatherum speciosum*	105	19
		R030XB010NV 030XB029NV_1	Galleta - *Pleuraphis jamesii*	68	12
		030XB019NV_1	Indian ricegrass - *Achnatherum hymenoides*	101	18
		R030XB006NV	Indian ricegrass - *Achnatherum hymenoides* / Shadscale - *Atriplex confertifolia*	39	7
		R029XY022NV	Unidentified	5	1
Oak Springs - 01050 / 191,412	767 / <1%	R029XY079NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	122	16
		R029XY006NV	Indian ricegrass - *Achnatherum hymenoides*	35	5
		R029XY008NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	6	1
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Desert needlegrass - *Achnatherum speciosum*	212	27

Table 3.12-9 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Alternative D (Continued)

Allotment Name/Size (acres)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Oak Springs (Continued)		R029XY079NV	Indian ricegrass -*Achnatherum hymenoides* / Spiny hopsage - *Grayia spinosa*	176	23
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	79	10
		R029XY049NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	96	13
		R029XY008NV	Low sagebrush - *Artemisia arbuscula*	25	3
		R029XY020NV	Winterfat - *Krascheninnikovia lanata*	6	1
		029XY010NV_3	Wyoming big sagebrush - *Artemisia tridentata*	10	1
Shingle Pass - 00906 / 75,280	103 / <1%	R028AY030NV	Winterfat - *Krascheninnikovia lanata*	26	25
		R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	77	75
Simpson - 21004 / 8,088	127 / 2%	R029XY059NV	Shadscale - *Atriplex confertifolia* / Winterfat - Krascheninnikovia lanata	127	100
South Spring Valley - 10130 / 84,624	138 / <1%	R028AY013NV	Black sagebrush - *Artemisia nova*	1	<1
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	67	49
		R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	55	40
		Data Gap	Unidentified	15	11
Sunnyside - 21023 / 72,094	514 / 1%	R029XY008NV R029XY006NV	Black sagebrush - *Artemisia nova*	107	21
		R028AY030NV	Winterfat - *Krascheninnikovia lanata*	47	9
		R028AY015NV R028AY001NV	Wyoming big sagebrush - *Artemisia tridentata*	360	70
Wilson Creek - 01201 / 567,448	1,805 / <1%	R029XY008NV R028AY013NV R028AY015NV	Black sagebrush - *Artemisia nova*	275	15
		R028AY050NV R028AY088NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	87	5
		R029XY046NV 029XY049NV_2	Indian ricegrass - *Achnatherum hymenoides*	252	14

Table 3.12-9 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Alternative D (Continued)

Allotment Name/Size (acres)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Wilson Creek (Continued)		R029XY008NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	94	5
		R028AY015NV R029XY006NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	99	5
		R029XY046NV R029XY059NV	Shadscale - *Atriplex confertifolia* / Winterfat - Krascheninnikovia lanata	118	7
		R029XY046NV R029XY159NV R029XY020NV	Winterfat - *Krascheninnikovia lanata*	346	19
		R028AY013NV R028AY015NV R028AY001NV	Wyoming big sagebrush - *Artemisia tridentata*	521	29
		F028AY074NV	Unidentified	13	1

[1] Unidentified plant communities are due to soil data gaps and incomplete ecological site surveys.

There is the risk that halogeton or other invasive plants could invade the ROW disturbed areas and hamper the establishment of quality forage species. Invasive vegetation degrades quality forage in several ways. Weeds out compete most native plants and can lead to a homogeneous vegetative landscape. Weedy habitats often contain fewer highly nutritious forage species for grazers. The potential for invasive vegetation that is currently occurring to spread, and for new invasive species to be introduced, would be highest along the linear features (e.g., roads, pipeline system). However, this risk would be offset by ACMs for weed treatment (A.1.82 through A.1.89).

Permanent surface disturbances would consist of access roads and aboveground facilities. A total of 564 acres affecting 11 allotments would have a permanent reduction in grazing forage production. **Table 3.12-10** gives a breakdown of permanent facility-related surface impacts by grazing allotment.

Table 3.12-10 Aboveground Facility Permanent Impacts by Grazing Allotment, Alternative D

Project Facility	Basin	Allotment	Impacted Acreage
Access Road	Cave Valley	NV - Sunnyside - 21023	20
	Coyote Spring Valley	NV - Delamar - 01083	39
		NV - Lower Lake East - 21022	15
	Delamar Valley	NV - Buckhorn - 21012	42
		NV - Oak Springs - 01050	30
	Dry Lake Valley	NV - Cliff Springs - 21016	25
		NV - Ely Springs - 11029	35
		NV - Oak Springs - 01050	23
		NV - Simpson - 21004	11
		NV - Wilson Creek - 01201	88
	Lake Valley	NV - Geyser Ranch - 01101	24
		NV - Wilson Creek - 01201	26
	Spring Valley	NV - Wilson Creek - 01201	14

Table 3.12-10 Aboveground Facility Permanent Impacts by Grazing Allotment, Alternative D (Continued)

Project Facility	Basin	Allotment	Impacted Acreage
Electrical Substation Site - Primary	Dry Lake Valley	NV - Oak Springs - 01050	10
	Spring Valley	NV - South Spring Valley - 10130	45
Eleetrieal Substation Site - Seeondary	Cave Valley	NV - Sunnyside - 21023	1
	Coyote Spring Valley	NV - Lower Lake East - 21022	7
Pressure Reducing Station	Coyote Spring Valley	NV - Lower Lake East - 21022	7
	Dry Lake Valley	NV - Wilson Creek - 01201	4
Pumping Station Site	Lake Valley	NV - Geyser Raneh - 01101	5
	Spring Valley	NV - South Spring Valley - 10130	75
Regulating Tank Site	Delamar Valley	NV - Buekhorn - 21012	3
	Dry Lake Valley	NV - Oak Springs - 01050	8
		NV - Wilson Creek - 01201	5
	Lake Valley	NV - Geyser Raneh - 01101	2

During the reclamation process, 6,519 acres would be reclaimed to a productive condition. This recovery process would be long-term and would initially reduce grazing forage production.

Maintenance activities for operational facilities are unlikely to have additional impacts to rangelands and livestock grazing since they would be conducted in areas already described as permanently disturbed. If maintenance or repair activities require additional ROWs, prior approval would be obtained from the BLM.

All construction and maintenance activities have the potential to reduce forage production and palatability due to the deposition of fugitive dust particles around areas of construction and along unpaved roads. The effect of dust deposition on livestock grazing can vary depending on factors such as wind, frequency, and timing of precipitation events, and the availability of palatable vegetation elsewhere within the affected allotments. These effects would be offset by ACMs for air quality (A.10.1, A.10.2, A.10.4, and A.10.6 through A.10.8).

Conclusion. Acreage and forage production in the grazing allotments crossed by the ROWs would be disturbed. The reclamation would take more than 2 years to complete; therefore, this would be considered a long-term impact. ACMs for weed treatment would help to ensure that the vegetation restoration is completed in a timely manner and that invasive weed species are controlled to the extent possible. There may be a short-term loss of forage production and/or quality due to dust deposition. ACMs related to air quality would reduce the dust-related effects.

Proposed mitigation measures:

ROW-GRA-1: Temporary Fencing or Closure In Livestock Use Areas. The SNWA would conduct pre-construction surveys to determine areas of livestock use in and adjacent to the construction ROW where application of temporary fencing or closure would be needed for revegetation species establishment. The results of these surveys would be provided to the BLM for review and approval. Reseeded areas that are temporarily fenced or closed would be monitored by the SNWA on a yearly basis until the BLM determines that reseeded areas are self-sustaining, and fencing removed. The time frame for reclamation monitoring is a minimum of two growing years or until the BLM determines that reclamation meets BLM BMP standards. Effectiveness: Temporary fencing or closure would be effective in improving the stabilization and persistence of reseeded areas in the short-term. In the long-term, annual precipitation from year to year, and the seasonal use by livestock and wildlife within the allotment would determine the survival of reseeded plants. Effects on other resources: Temporary fencing would also limit wild horse access to forage inside fenced areas. Big game species would not likely be deterred by temporary livestock fencing. Temporary fencing in riparian areas could improve the recovery rate of shrubs and herbs that assist in stabilizing channel banks.

ROW-AQ-2: **Alternative Dust Control Measures**. Areas where soil tackifiers are prohibited (e.g., threatened and endangered species habitat, perennial stream drainages) would be determined in cooperation with the BLM and the USFWS prior to construction, and identified in both the Construction and Mitigation Plans. Other mitigation (e.g., gravel application) may be required to reduce impacts and to ensure protection of public safety. This measure would supplement SNWA ACM A.10.3.

ROW-VEG-1: Native Seed Collection. The SNWA, in consultation with the BLM, would develop a seed collection program for native plant species found within the ROW. These native plant seeds would be used along the ROW corridor in revegetation and reclamation activities, to the extent feasible, to enhance the rate and quality of recovery. Seed from locally adapted native sources would likely provide the greatest rates of establishment and subsequent growth, increasing the success of reclamation efforts. Target species and collection methods would be identified in the Restoration Plan.

GW-WL-1: Avoid Siting Facilities in Key Big Game Habitats. Avoid locating wells, new roads, or other linear facilities within key big game habitats including crucial summer and winter ranges, and occupied bighorn sheep habitats. Where avoidance is not practicable, the SNWA would improve 2 acres of comparable habitat for every 1 acre disturbed.

Residual impacts include:

- Short-term loss of forage production and/or quality due to dust deposition as a result of construction and maintenance activities.
- Short- and long-term disturbance in grazing allotments crossed by the GWD Project ROWs. In addition, permanent disturbance would be seen in areas where permanent facilities are constructed. Long-term loss of forage production due to surface disturbance in 7,083 acres along the ROW.
- Long-term potential for a reduction of quality vegetation from the establishment of invasive weedy species.

Injury to Livestock

As discussed for the Proposed Action, open trenches could result in low level impacts to livestock from injury or mortalities. The same applicant-committed measures discussed for the Proposed Action would be applied to this issue involving potential injury to livestock.

Conclusion. There is potential for livestock to be injured or killed due to open trenches and fencing, although ACM A.1.42, A.1.12, and A.1.17 and the guidance provided in the Ely FEIS/ROD reduce this potential impact.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term potential for livestock injury or death due to open trenches or fencing.

Livestock Movement

Pipeline construction could interfere with the normal movement of livestock due to the presence of construction personnel, open trenches, staging areas, and temporary fencing. This could result in inaccessible areas of rangeland in the short-term. Results could include concentrated grazing in accessible areas and an inability to access water sources in restricted areas. ACM A.8.4 would require that alternative water sources (water troughs or similar) be made available if access to water sources is restricted.

Effects of concentrated grazing potentially would include soil compaction and overgrazed vegetation. As discussed for the Proposed Action, ACM A.8.1 would involve pre-construction coordination with the BLM and grazing permit holders to allow for advance planning of grazing practices.

Conclusion. Interference with normal livestock movement would be short-term. ACMs would provide adequate water supplies and protect wildlife and rangeland resources.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term potential for concentrated grazing resulting in soil compaction and overgrazed vegetation.

Range Improvements

Pipeline and power line construction would cross 14 grazing allotments. Due to the size of the project area, it is impracticable to identify all the rangeland improvements that are located on these allotments; however, all improvements would be documented prior to the start of construction activities. Temporary removal or damage to some improvements (e.g., fences, cattle guards, water sources) could occur. Any improvements that are removed or damaged would be replaced or repaired to BLM standards upon completion of construction; protocols for documenting, replacing, and repairing rangeland improvements are included in ACM A.8.2.

Conclusion. According to ACM A.8.2, preconstruction conditions would be documented and range improvements disturbed by construction activities would be restored to their previous condition upon construction completion.

Proposed mitigation measures:

None.

Residual impacts include:

- Temporary removal or destruction of rangeland improvements.

Animal-vehicle Collisions

There is potential for livestock to be injured or killed from animal-vehicle collisions, although ACM A.2.1 would reduce the potential by restricting vehicle speeds to 25 mph or less in construction areas. ACM A.8.3 specifies that property owners would be compensated at fair market value for any livestock struck by a vehicle directly associated with construction activities.

Conclusion. ACMs would adequately protect range animals from vehicles and property owners from incurring loss due to animal-vehicle collision.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term potential for injury to livestock due to construction activities.
- Short- and long-term potential for animal-vehicle collisions due to operation and maintenance activities.

3.12.2.4 Alternatives E and F

Construction and Facility Maintenance

Reduction of Rangeland Carrying Capacity

Temporary surface disturbance areas consist of the pipeline and power line ROWs and construction support areas. A total of 8,937 acres affecting 20 allotments would be disturbed and there would be a long-term reduction of grazing forage production. Impacts to vegetation communities within the affected allotments are shown in **Table 3.12-11**. The reclamation process would take two growing years after construction is completed or until the BLM determines that reclamation meets BLM BMP standards. Areas where the BLM determines that fencing is necessary to protect reclamation success will be developed per BLM policy. If large sections of pastures are fenced the fence will be built according to BLM design standards and will allow for wildlife and livestock movement and access. If it is determined that the entire pasture needs to be closed to achieve reclamation standards, the permittee may be compensated per BLM policy (see Mitigation Measure ROW-GRA-1). The COM Plan would be developed and implemented to monitor the success of vegetation reclamation for all project related surface disturbing activities. The COM Plan, which would include the incorporation of the Reclamation Plan, would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Table 3.12-11 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Alternatives E and F

Allotment Name/Size (acre)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Buckhorn - 21012 / 80,664	618 / 1%	030XB001NV_1	Black sagebrush - *Artemisia nova*	19	3
		R029XY079NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	3	<1
		R029XY085NV	Desert needlegrass - *Achnatherum speciosum*	30	5
		R030XB010NV	Galleta - *Pleuraphis jamesii*	39	6
		029XY017NV_3	Indian ricegrass - *Achnatherum hymenoides* / Shadscale - *Atriplex confertifolia*	109	18
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Spiny Hopsage - *Grayia spinosa*	92	15
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	198	32
		R029XY059NV	Shadscale - *Atriplex confertifolia*	59	10
		R029XY079NV	Unidentified	69	11
Cave Valley Ranch - 00904 / 38,585	63 / <1%	R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	63	100
Cleveland Ranch - 01119 / 16,749	12 / <1%	R028AY013NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	12	100

Table 3.12-11 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Alternatives E and F (Continued)

Allotment Name/Size (acre)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Cliff Springs - 21016 / 32,964	289 / 1%	R029XY079NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	3	1
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Desert needlegrass - *Achnatherum speciosum*	43	15
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Spiny hopsage - *Grayia spinosa*	134	46
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	109	38
Cold Spring - 00909 / 13,102	68 / <1%	R028BY008NV	Indian ricegrass - *Achnatherum hymenoides*	5	7
		R028BY080NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	4	6
		F028BY060NV	Wyoming big sagebrush - *Artemisia tridentata*	5	7
		R028BY070NV R028BY011NV	Unidentified	54	80
Cottonwood - 00132 / 49,964	384 / 1%	R028AY015NV	Black sagebrush - *Artemisia nova*	216	56
		R028AY030NV	Winterfat - *Krascheninnikovia lanata*	6	2
		R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	162	42
Delamar - 01083 / 165,499	560 / <1%	030XB019NV_2	Black sagebrush - *Artemisia nova*	50	9
		030XB019NV_2	Creosotebush - *Larrea tridentata*	152	27
		030XB019NV_1	Indian ricegrass - *Achnatherum hymenoides*	266	48
		030XB005NV_4	White bursage - *Ambrosia dumosa*	88	16
		Data Gap	Unidentified	4	<1
Ely Springs - 11029 / 57,849	430 / 1%	R029XY042NV R029XY046NV	Indian ricegrass - *Achnatherum hymenoides*	340	79
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	15	3
		R029XY059NV	Shadscale - *Atriplex confertifolia* / Winterfat - Krascheninnikovia lanata	21	5
		R029XY042NV	Winterfat - *Krascheninnikovia lanata*	54	13

Table 3.12-11 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Alternatives E and F (Continued)

Allotment Name/Size (acre)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Geyser Ranch - 01101 / 247,746	722 / <1%	R028AY043NV	Basin wildrye - *Leymus cinereus* / Bluebunch wheatgrass - *Pseudoroegneria spicata*	136	19
		R028AY008NV	Black greasewood - *Sarcobatus vermiculatus*	58	8
		R028AY050NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	12	2
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	83	11
		R028AY015NV	Indian ricegrass -*Achnatherum hymenoides* / Wyoming big sagebrush - *Atremisia tridentata*	47	7
		R028AY015NV 028AY008NV_1 R028AY001NV	Wyoming big sagebrush - *Artemisia tridentata*	357	49
		Data Gap	Unidentified	29	4
Lower Lake East - 21022 / 52,550	563 / 1%	030XB019NV_2	Black sagebrush - *Artemisia nova*	76	13
		R030XB006NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	35	6
		R030XB019NV	Creosotebush - *Larrea tridentata*	134	24
		R029XY085NV	Desert needlegrass - *Achnatherum speciosum*	105	19
		R030XB010NV 030XB029NV_1	Galleta - *Pleuraphis jamesii*	68	12
		030XB019NV_1	Indian ricegrass - *Achnatherum hymenoides*	101	18
		R030XB006NV	Indian ricegrass - *Achnatherum hymenoides* / Shadscale - *Atriplex confertifolia*	39	7
		R029XY022NV	Unidentified	5	1
Majors - 10126 / 103,533	713 / 1%	R028AY013NV R028AY004NV	Black sagebrush - *Artemisia nova*	102	14
		R029XY079NV	Bluebunch wheatgrass - *Pseudoroegneria spicata*	4	1
		R028BY008NV R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	86	12

Table 3.12-11 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Alternatives E and F (Continued)

Allotment Name/Size (acre)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Majors (Continued)		R028BY013NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	313	44
		R028BY013NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	43	6
		F028BY058NV R028AY017NV R028AY015NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	51	7
		F028BY060NV R028AY013NV	Wyoming big sagebrush - *Artemisia tridentata*	108	15
		R028BY070NV	Unidentified	6	1
Oak Springs - 01050 / 191,412	767 / <1%	R029XY079NV	Bluebunch wheatgrass - *Psendoroegneria spicata*	122	16
		R029XY006NV	Indian ricegrass - *Achnatherum hymenoides*	35	5
		R029XY008NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	6	1
		R029XY079NV	Indian ricegrass - *Achnatherum hymenoides* / Desert needlegrass - *Achnatherum speciosum*	211	27
		R029XY079NV	Indian ricegrass -*Achnatherum hymenoides* / Spiny hopsage - *Grayia spinosa*	176	23
		R029XY042NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	79	10
		R029XY049NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	96	13
		R029XY008NV	Low sagebrush - *Artemisia arbuscula*	25	3
		R029XY020NV	Winterfat - *Krascheninnikovia lanata*	6	1
		029XY010NV_3	Wyoming big sagebrush - *Artemisia tridentata*	10	1
		029XY077NV	Unidentified	1	<1
Shingle Pass - 00906 / 75,280	103 / <1%	R028AY030NV	Winterfat - *Krascheninnikovia lanata*	26	25
		R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	77	75

Table 3.12-11 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Alternatives E and F (Continued)

Allotment Name/Size (acre)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Simpson - 21004 / 8,088	127 / 2%	R029XY059NV	Shadscale - *Atriplex confertifolia* / Winterfat - Krascheninnikovia lanata	127	100
South Spring Valley - 10130 / 84,624	386 / <1%	028AY121NV_1	Basin wildrye - *Leymus cinerens*	33	8
		R028AY004NV R028AY013NV	Black sagebrush - *Artemisia nova*	3	1
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	111	29
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	28	7
		R028AY015NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	141	37
		R028AY015NV	Wyoming big sagebrush - *Artemisia tridentata*	55	14
		Data Gap	Unidentified	15	4
Sunnyside - 21023 / 72,094	514 / 1%	R029XY008NV R029XY006NV	Black sagebrush - *Artemisia nova*	107	21
		R028AY030NV	Winterfat - *Krascheninnikovia lanata*	47	9
		R028AY015NV R028AY001NV	Wyoming big sagebrush - *Artemisia tridentata*	360	70
Tamberlaine - 00901 / 36,839	143 / <1%	R028BY080NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	65	45
		R028BY011NV R028BY045NV	Unidentified	78	55
West Schell Bench - 00433 / 50,279	115 / <1%	R028BY011NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	19	17
		R028BY013NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	1	1
		R028BY086NV	Wyoming big sagebrush - *Artemisia tridentata*	26	22
		R028BY011NV R028BY089NV	Unidentified	69	60

Table 3.12-11 Right-of-way Impacts to Vegetation Communities by Grazing Allotment, Alternatives E and F (Continued)

Allotment Name/Size (acre)	Surface Disturbance (acres)/ Percent of Allotment	Ecosite ID	Vegetation Community[1]	Surface Disturbance Acres	Percentage of Surface Disturbance within Allotment
Willow Springs - 10129 / 85,708	555 / 1%	028AY121NV_1	Basin wildrye - *Leymus cinerens*	39	7
		R028AY004NV	Black sagebrush - *Artemisia nova*	4	1
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides*	178	32
		R028AY013NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	171	31
		R028BY013NV	Indian ricegrass - *Achnatherum hymenoides* / Winterfat - *Krascheninnikovia lanata*	12	2
		R028AY015NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	151	27
Wilson Creek - 01201 / 567,448	1,805 / <1%	R029XY008NV R028AY013NV R028AY015NV	Black sagebrush - *Artemisia nova*	274	15
		R028AY050NV R028AY088NV	Bluebunch wheatgrass - *Psendoroegneria spicata*	87	5
		R029XY046NV 029XY049NV_2	Indian ricegrass - *Achnatherum hymenoides*	252	14
		R029XY008NV	Indian ricegrass - *Achnatherum hymenoides* / Black sagebrush - *Artemisia nova*	94	5
		R028AY015NV R029XY006NV	Indian ricegrass - *Achnatherum hymenoides* / Wyoming big sagebrush - *Artemisia tridentata*	99	5
		R029XY046NV R029XY059NV	Shadscale - *Atriplex confertifolia* / Winterfat - Krascheninnikovia lanata	118	7
		R029XY046NV R029XY159NV R029XY020NV	Winterfat - *Krascheninnikovia lanata*	346	19
		R028AY013NV R028AY015NV R028AY001NV	Wyoming big sagebrush - *Artemisia tridentata*	521	29
		F028AY074NV R028AY088NV	Unidentified	14	1

[1] Unidentified plant communities are due to soil data gaps and incomplete ecological site surveys.

There is the risk that halogeton or other invasive plants could invade the ROW disturbed areas and hamper the establishment of quality forage species. Invasive vegetation degrades quality forage in several ways. Weeds out compete most native plants and can lead to a homogeneous vegetative landscape. Weedy habitats often contain fewer highly nutritious forage species for grazers. The potential for invasive vegetation that is currently occurring to spread, and for new invasive species to be introduced, would be highest along the linear features (e.g., roads, pipeline system). However, this risk would be offset by ACMs for weed treatment (A.1.82 through A.1.89).

Permanent surface disturbances would consist of access roads and aboveground facilities. A total of 562 acres affecting 16 allotments would have a permanent reduction of grazing forage production. **Table 3.12-12** gives a breakdown of permanent facility-related surface impacts by grazing allotment.

During the reclamation process 8,375 acres would be reclaimed to a productive condition. This recovery process would be long-term and would initially reduce grazing forage production for all affected allotments.

Maintenance activities for operational facilities are unlikely to have additional impacts to rangelands and livestock grazing, since they would be conducted in areas already described as permanently disturbed. If maintenance or repair activities require additional ROWs, prior approval would be obtained from the BLM.

All construction and maintenance activities have the potential to reduce forage production and palatability due to the deposition of fugitive dust particles around areas of construction and along unpaved roads. ACMs for air resources (A.10.1, A.10.2, A.10.4, and A.10.6 through A.10.8) would be applied for this issue involving potential dust effects on livestock forage.

Table 3.12-12 Aboveground Facility Permanent Impacts by Grazing Allotment, Alternatives E and F

Project Facility	Basin	Allotment	Impacted Acreage
Access Road	Cave Valley	NV - Sunnyside - 21023	20
	Coyote Spring Valley	NV - Delamar - 01083	39
		NV - Lower Lake East - 21022	15
	Delamar Valley	NV - Buckhorn - 21012	42
		NV - Oak Springs - 01050	30
	Dry Lake Valley	NV - Cliff Springs - 21016	25
		NV - Ely Springs - 11029	35
		NV - Oak Springs - 01050	23
		NV - Simpson - 21004	11
		NV - Wilson Creek - 01201	88
	Lake Valley	NV - Geyser Ranch - 01101	24
		NV - Wilson Creek - 01201	26
	Spring Valley	NV - Wilson Creek - 01201	14
Electrical Substation Site - Primary	Dry Lake Valley	NV - Oak Springs - 01050	10
	Spring Valley	NV - South Spring Valley - 10130	45
Electrical Substation Site - Secondary	Cave Valley	NV - Sunnyside - 21023	1
	Coyote Spring Valley	NV - Lower Lake East - 21022	7
Pressure Reducing Station	Coyote Spring Valley	NV - Lower Lake East - 21022	7
	Dry Lake Valley	NV - Wilson Creek - 01201	4
Pumping Station Site	Lake Valley	NV - Geyser Ranch - 01101	5
	Spring Valley	NV - South Spring Valley - 10130	75

Table 3.12-12 Aboveground Facility Permanent Impacts by Grazing Allotment, Alternatives E and F (Continued)

Project Facility	Basin	Allotment	Impacted Acreage
Regulating Tank Site	Delamar Valley	NV - Buckhorn - 21012	5
	Dry Lake Valley	NV - Oak Springs - 01050	5
		NV - Wilson Creek - 01201	4
	Lake Valley	NV - Geyser Ranch - 01101	2

Conclusion. Acreage and forage production in the grazing allotments crossed by the ROW would be disturbed. The reclamation would take more than 2 years to complete; therefore, this would be considered a long-term impact. ACMs for weed treatment would help to ensure that the vegetation restoration is completed in a timely manner and that invasive weed species are controlled to the extent possible. There may be a short-term loss of grazing forage production and/or quality due to dust deposition. ACMs related to air quality will reduce the dust-related effects.

Proposed mitigation measures:

ROW-GRA-1: Temporary Fencing or Closure In Livestock Use Areas. The SNWA would conduct pre-construction surveys to determine areas of livestock use in and adjacent to the construction ROW where application of temporary fencing or closure would be needed for revegetation species establishment. The results of these surveys would be provided to the BLM for review and approval. Reseeded areas that are temporarily fenced or closed would be monitored by the SNWA on a yearly basis until the BLM determines that reseeded areas are self-sustaining, and fencing removed. The time frame for reclamation monitoring is a minimum of two growing years or until the BLM determines that reclamation meets BLM BMP standards. Effectiveness: Temporary fencing or closure would be effective in improving the stabilization and persistence of reseeded areas in the short-term. In the long-term, annual precipitation from year to year, and the seasonal use by livestock and wildlife within the allotment would determine the survival of reseeded plants. Effects on other resources: Temporary fencing would also limit wild horse access to forage inside fenced areas. Big game species would not likely be deterred by temporary livestock fencing. Temporary fencing in riparian areas could improve the recovery rate of shrubs and herbs that assist in stabilizing channel banks.

ROW-AQ-2: **Alternative Dust Control Measures**. Areas where soil tackifiers are prohibited (e.g., threatened and endangered species habitat, perennial stream drainages) would be determined in cooperation with the BLM and the USFWS prior to construction, and identified in both the Construction and Mitigation Plans. Other mitigation (e.g., gravel application) may be required to reduce impacts and to ensure protection of public safety. This measure would supplement SNWA ACM A.10.3.

ROW-VEG-3: Green Stripping. SNWA, in consultation with the BLM, would develop a green stripping revegetation prescription where BLM and SNWA preventive and control measures may be inadequate to mitigate risks of weed invasion and wildfire. Green stripping is defined as ROW revegetation with fast-growing herbaceous species that can outcompete annual and perennial weeds and can provide a green firebreak. Locations where this measure may be applied would be identified in the Restoration Plan, Integrated Weed Management Plan, and Fire Prevention Plan, and approved by the BLM Visual Resource Management Coordinator. For example, it would be applied primarily to Great Basin Desert low elevation bottomlands, with limited applications to open evergreen woodlands (due to low risk for weed invasion) and Mojave Desert lowlands (due to low risk as a fire disturbance ecosystem).

GW-WL-1: Avoid Siting Facilities in Key Big Game Habitats. Avoid locating wells, new roads, or other linear facilities within key big game habitats including crucial summer and winter ranges, and occupied bighorn sheep habitats. Where avoidance is not practicable, the SNWA would improve 2 acres of comparable habitat for every 1 acre disturbed.

Residual impacts include:

- Short-term loss of grazing forage and/or quality due to dust deposition as a result of construction and maintenance activities.
- Short- and long-term disturbance in grazing allotments crossed by the GWD Project ROWs. In addition, permanent disturbance would be seen in areas where permanent facilities are constructed. Long-term loss of grazing forage production due to surface disturbance in 8,937 acres along the ROW.
- Long-term potential for a reduction of quality vegetation from the establishment of invasive weedy species.

Injury to Livestock

The potential effects of open trenches on livestock for Alternatives E and F would be the same as discussed for the Proposed Action. ACMs would be applied to reduce injury or mortalities to livestock.

Conclusion. There is potential for livestock to be injured or killed due to open trenches and fencing, although ACMs A.1.42, A.1.12, and A.1.17 and the guidance provided in the Ely Final EIS/ROD reduce this potential impact.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term potential for livestock injury or death due to open trenches or fencing.

Livestock Movement

The effects of ROW and facility construction on livestock movement for Alternatives E and F would be the same as discussed for the Proposed Action. The only notable difference is livestock in Snake Valley allotments would not be affected for this alternative. ACM A.8.4 would require that alternative water sources (water troughs or similar) be made available if access to water sources is restricted.

Effects of concentrated grazing potentially would include soil compaction and overgrazed vegetation. As stated in ACM A.8.1, to ensure the best use of available rangeland, pre-construction coordination with the BLM and grazing permit holders would be conducted to allow for advance planning of grazing practices.

Conclusion. Interference with livestock movement would be short-term. ACMs would provide adequate water supplies and protect wildlife and rangeland resources.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term potential for concentrated grazing resulting in soil compaction and overgrazed vegetation.

Range Improvements

Pipeline and power line construction would cross 20 grazing allotments. Due to the size of the project area, it is impracticable to identify all the rangeland improvements that are located on these allotments; however, all improvements would be documented prior to the start of construction activities. Temporary removal or damage to some improvements (e.g., fences, cattle guards, water sources) could occur. Any improvements that are removed or damaged would be replaced or repaired to BLM standards upon completion of construction; protocols for documenting, replacing, and repairing rangeland improvements are included in ACM A.8.2.

Conclusion. According to ACM A.8.2, pre-construction conditions would be documented and range improvements disturbed by construction activities would be restored to their previous condition upon construction completion.

Proposed mitigation measures:

None.

Residual impacts include:

- Temporary removal or destruction of rangeland improvements.

Animal-vehicle Collisions

There is potential for livestock to be injured or killed from animal-vehicle collisions, although ACM A.2.1 would reduce the potential by restricting vehicle speeds to 25 mph or less in construction areas. ACM A.8.3 specifies that property owners would be compensated at fair market value for any livestock struck by a vehicle associated with construction activities.

Conclusion. ACMs would adequately protect range animals from vehicles and property owners from incurring loss due to an animal-vehicle collision.

Proposed mitigation measures:

None.

Residual impacts include:

- Short-term potential for injury to livestock due to construction activities.
- Short- and long-term potential for animal-vehicle collisions due to operation and maintenance activities.

3.12.2.5 Alignment Options 1 through 4

Impacts for Alignment Options 1 through 4 are identified in relation to the relevant segment of the Proposed Action (**Table 3.12-13**).

Table 3.12-13 Rangeland and Livestock Grazing Impact Summary for Alignment Options 1 through 4

Alignment Options	Analysis
Alignment Option 1 (Humboldt-Toiybe Power Line Alignment) **Option Description**: Change the locations of a portion of the 230-kV power line from Gonder Substation near Ely to Spring Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• This option transmission line alignment would result in 24 fewer acres of surface disturbance, and consequently a slightly smaller long-term loss of livestock forage compared to Proposed Action segment. Access for livestock would be slightly better than the Proposed Action alignment because the option would widen an existing transmission line ROW.
Alignment Option 2 (North Lake Valley Pipeline Alignment) **Option Description**: Change the locations of portions of the mainline pipeline and electrical transmission line in North Lake Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• This option would cause long-term surface disturbance of 23 more acres of sagebrush shrubland to construct the mainline pipeline and transmission, and would commit 5 more acres for long-term industrial use for a pump station as compared to the relevant Proposed Action segment.

Table 3.12-13 Rangeland and Livestock Grazing Impact Summary for Alignment Options 1 through 4 (Continued)

Alignment Options	Analysis
Alignment Option 3 (Muleshoe Substation and Power Line Alignment) **Option Description**: Eliminate the Gonder to Spring Valley transmission line and construct a substation for interconnection with an interstate, high voltage power line in Muleshole Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• This option would eliminate all vegetation clearing associated with construction of a 230-kV transmission line from Gonder Substation near Ely to Spring Valley, with a surface disturbance reduction of 410 acres as compared to the Proposed Action. Construction of the Muleshoe Substation would require an additional long-term land commitment of 43 acres of sagebrush shrubland for industrial uses as compared to the Proposed Action.
Alignment Option 4 (North Delamar Valley Pipeline and Power Line Alignment) **Option Description**: Change the location of a short section of mainline pipeline in Delamar Valley to follow an existing transmission line. **Applicable To**: All alternatives.	• This option would be located adjacent to an existing transmission line and would be shorter by 2 miles (representing 24 fewer acres of surface disturbance), as compared to the relevant Proposed Action segment. However, a 10-acre pump station (5 acres permanent and 5 acres temporary) would be constructed adjacent to the Highway 93. As a consequence, implementation of the option would result in 14 fewer acres of long-term surface disturbance to Mojave desert shrubland, as compared to the relevant Proposed Action segment.

3.12.2.6 No Action

Under the No Action Alternative, the project would not be constructed or operated as proposed; therefore, no proposed project-related surface disturbance would occur. Impacts to grazing allotments would continue at present levels as a result of natural conditions and existing and other proposed development within the project area. Livestock management on public lands would continue to be directed by the Ely and Southern Nevada District offices in Nevada and the Fillmore Field Office in Utah.

3.12.2.7 Comparison of Alternatives

Table 3.12-14 provides a comparison of impacts for construction and facility maintenance of the Proposed Action and Alternatives A through F.

Table 3.12-14 Comparison of Alternatives

Parameter	Proposed Action and Alternatives A through C	Alternative D	Alternatives E and F
Allotments Located within ROWs or Facilities	23	14	20
Temporary Reduction in Acres	10,544	7,083	8,937
Permanent Reduction in Acres	708	564	562

3.12.2.8 Groundwater Development and Groundwater Pumping

Issues

Groundwater Field Development Construction and Facility Maintenance

- Temporary reduction of rangeland carrying capacity due to surface disturbance. Permanent reduction of rangeland carrying capacity due to permanent surface disturbance for roads and facilities.
- Loss of, or injury to, livestock due to open trenches and fences.
- Effects to livestock movement due to staging of pipeline and power line equipment.
- Impacts to rangeland improvements.
- Animal-vehicle collisions.

Groundwater Pumping

- Potential effects of groundwater pumping on water source availability for livestock.
- Effects of groundwater drawdown on forage production due to loss of or changes to vegetation production or composition (see Section 3.5, Vegetation Resources).

Assumptions

The following assumptions were used in the impact analysis for rangelands and livestock grazing:

Groundwater Field Development Construction and Facility Maintenance

- Short-term impacts are defined as less than 2 years. Long-term impacts are defined as greater than 2 years. Permanent impacts assume that the land will not be reclaimed or returned to its previous use.
- In situations where the Las Vegas RMP does not specify management actions related to range management and livestock grazing, the actions described in the Ely RMP will be used.
- Current grazing allotment carrying capacities are appropriate and reflect the desired level for the present and foreseeable future of the affected allotments.

Groundwater Pumping

- Springs and streams are high value areas and impacts to them need to be qualified or, where possible, quantified as the best means for determining impacts to livestock grazing forage.
- An index drawdown contour of 10 feet is assumed to be a reasonable estimate of the point at which long-term changes to vegetation community vigor and composition would begin to appear (see Section 3.5, Vegetation Resources, for greater detail on the anticipated changes in response to drawdown).
- A groundwater depth of 50 feet or deeper in relation to the ground surface elevation is not accessible to the roots of nearly all phreatophytic shrubs, and this groundwater depth represents a reasonable boundary for: 1) estimating the deepest root zone extent of plant communities that are at least partially dependent on underlying groundwater and 2) defining a groundwater drawdown boundary that assumes that the roots of overlying plant communities no longer have access to groundwater as a moisture source at depths greater than 50 feet.
- ET units mapped as Wetland/Meadow and Basin Shrubland cover types represent the primary cover types that would be affected by drawdown effects.
- Groundwater pumping could impact groundwater-feed water sources in the high- to medium-risk areas identified within rangeland grazing allotments. Information related to groundwater development areas and groundwater pumping, including the methodology, assumptions, and limitations of the CCRP groundwater model developed specifically for this project, is available in Section 3.3, Water Resources.
- Assumptions about the potential changes in livestock water sources and forage (vegetation composition and structure) from groundwater pumping do not incorporate additional assumptions about the effects of climate change because specific long term effects of climate change are not presently known, and the incremental

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contribution of climate change effects to project effects cannot be reasonably estimated. A general discussion of climate change effects is provided in Section 3.1, Air and Atmospheric Values.

Methodology for Analysis

Groundwater Field Development Construction and Facility Maintenance

- For the impact analysis study, impact parameters were used as both an indication of impacts and as a means of quantifying impacts. These parameters also allowed for comparison between alternatives or groups of alternatives.
- Estimates of change to livestock grazing forage production and management in grazing allotments were based on short- and long-term displacement of, and effects on, allotment forage production.
- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect rangeland resources from groundwater development activities.
- Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

Groundwater Pumping

- The 10-foot drawdown contour was applied to the springs and perennial stream reaches that were classified as being at risk from groundwater drawdown (Section 3.3, Water Resources). The springs included for analysis were those rated as presenting a "high" or "moderate" risk of effects. The number of springs, and miles of perennial stream reaches potentially affected were enumerated for each alternative during the three model time frames (full build out, full build out plus 75 years, full build out plus 200 years).
- Identification of water supplies within grazing allotments that occur within the water resources region of study were determined by the 10-foot and greater drawdown contour predicted by the groundwater model. Information related to groundwater development areas and groundwater pumping, including the methodology, assumptions, and limitations of the CCRP groundwater model developed specifically for this project, is available in Section 3.3, Water Resources.
- Wetland/Meadow and Basin Shrubland. The area enclosed by the maximum extent of the 10-foot drawdown contour was superimposed over the area of the primary ET units (Wetland/Meadow, Basin Shrubland cover types) to calculate the area of vegetation that could experience reductions in soil moisture and long-term vegetation community composition changes caused by groundwater drawdown of 10 feet or more at different points in time (full build out, full build out plus 75 years, and full build out plus 200 years). Figures were generated that illustrate the expansion of the 10-foot and greater drawdown contours over time in relation to the vegetation communities within the hydrographic ET boundaries (Section 3.5, Vegetation Resources).
- The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect rangeland resources from groundwater pumping activities.

3.12.2.9 Proposed Action

Groundwater Development Area

Construction, Operation, and Maintenance

Since the exact location of well field development facilities has not been determined, this impact discussion is general in regard to rangeland and livestock grazing. Further NEPA analysis would be required once specific locations for wells, collector lines, and other future facilities have been identified.

Reduction of Rangeland Carrying Capacity

Construction of well pads, transmission lines, access roads, and collector pipelines would cause similar reductions in forage availability, as discussed for pipeline and power line ROW construction. A maximum of approximately 8,400 acres would be temporarily disturbed by construction. Approximately 66 percent or 5,540 acres of the surface disturbance would be in the form of permanent facilities and would not be revegetated. Approximately 2,870 acres would be reclaimed to pre-construction conditions. This recovery would be a long-term process and would initially reduce the carrying capacity of grazing forage. The COM Plan would be developed and implemented to protect rangeland resources from groundwater development activities. The COM Plan would integrate protective measures from the following: BLM RMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

The Proposed Action could result in reduced forage quality from the spread of existing invasive vegetation and the introduction of new species of invasive vegetation. Invasive vegetation degrades quality forage in several ways. Weeds out-compete most native plants and can lead to a homogeneous vegetative landscape. Weedy habitats often contain fewer highly nutritious forage species for grazers. The potential for invasive vegetation that is currently occurring to spread and for new invasive species to be introduced would be highest along the linear features (e.g., roads, pipeline system). ACMs discussed for the Proposed Action ROWs and facilities also would be applied to groundwater development disturbance areas.

All construction and maintenance activities have the potential to reduce forage production and palatability due to the deposition of fugitive dust particles around areas of construction and along unpaved roads. The effect of dust deposition on livestock grazing can vary depending on factors such as wind, frequency and timing of precipitation events, and the availability of palatable vegetation elsewhere within the affected allotments. These effects would be offset by ACMs for air quality (A.10.1, A.10.2, A.10.4, and A.10.6 through A.10.8).

Proposed well development areas would be located within five hydrologic basins: Cave, Delamar, Dry Lake, Snake, and Spring valleys. A total of 41 grazing allotments (729,957 acres) are within, or partially within, the groundwater development areas. Although construction activities are expected to last 2 to 3 years, it could take several more years before temporary disturbance areas are successfully reclaimed. Even when vegetation is established following reclamation efforts, the composition of species in the recovery area is often different from the original plant community, which could result in the diminished quality of available forage. **Table 3.12-3** details the acreage of groundwater development areas within affected allotments that have the potential for disturbance by well field development.

Effects of concentrated grazing potentially would include soil compaction and overgrazed vegetation. As stated in ACM A.8.1, to ensure the best use of available rangeland, pre-construction coordination with the BLM and grazing permit holders would be conducted to allow for advance planning of grazing practices. To improve revegetation success in areas where livestock may congregate (e.g. water sources, corrals and bed grounds), it is recommended that SNWA install temporary fencing, and achieve revegetation results satisfactory to the BLM before temporary fencing is removed (ROW-GRA-1).

Injury to Livestock

Potential effects of open trenches during construction of linear pipelines would represent a low level impact to livestock, as discussed for the Proposed Action ROWs. The same ACMs would be applied to groundwater development activities involving open trenches to reduce livestock injuries or mortalities.

Livestock Movement

Construction of groundwater development areas could result in restrictions to livestock movements, as discussed for the Proposed Action ROWs. The same ACMs would be applied to groundwater development activities involving reductions in any restrictions to livestock movements.

Range Improvements

Groundwater development construction would cause surface disturbance in 41 grazing allotments. Construction of groundwater development areas could result in the removal or damage of rangeland improvements, as discussed for the

Proposed Action ROWs. The same ACMs would be applied to groundwater development activities involving documentation, replacement, and repairs to existing improvements.

Animal-vehicle Collisions

There is potential for livestock to be injured or killed by animal-vehicle collisions, although ACM A.2.1 would reduce the potential by restricting vehicle speeds to 25 mph or less in construction areas. ACM A.8.3 specifies that property owners would be compensated at fair market value for any livestock struck by a vehicle directly associated with construction activities.

Conclusion. Impacts resulting from the construction and operation of wells, access roads, collector pipelines, and supporting ancillary facilities in Snake, Spring, Delamar, Dry Lake, and Cave valleys would likely be similar to, but would affect more acres than the pipeline and power line ROWs. The main emphasis would be on loss of grazing acreage, loss of natural and man-made water sources, and an associated reduction of forage production. Livestock could potentially suffer injury or even death due to open trenches or fencing. Restrictions to free movement could result in compacted soil, overgrazed vegetation or the need to provide supplemental sources of water. Rangeland improvements could be damaged or removed by construction activities in the short term. Any changes to rangeland improvements would be returned to their post-construction state upon completion of construction activities. There is potential for livestock injury or death due to animal-vehicle collisions.

Proposed mitigation measures:

ROW-AQ-2: Alternative Dust Control Measure. ROW-AQ-2 would reduce fugitive dust deposition and potential effects on forage vegetation.

ROW-VEG-1: Green Stripping. ROW-VEG-1 would assist in the prevention of invasive weeds and effects on livestock forage.

ROW-GRA-1: Temporary fencing in livestock high use areas. ROW-GRA-1 would be implemented in sensitive areas of livestock use to improve revegetation success by providing short-term protection of reseeded surface disturbance.

GW-WL-1: Avoid siting facilities in key big game habitats. GW-WL-1 also would reduce impacts to livestock grazing by avoiding crucial summer and winter ranges when considering the placement of wells, roads, and other facilities.

Potential residual impacts include:

- Temporary and permanent loss of forage associated with construction and maintenance activities and permanent facilities.
- Short- and long-term potential for livestock injury or death due to construction and maintenance activities.
- Short-term potential for concentrated grazing resulting in soil compaction and overgrazed vegetation.
- Temporary removal of, or damage to, rangeland improvements.

Groundwater Pumping

The capacity of the habitat within each grazing allotment to sustain livestock includes consideration of adequate forage, water, space, and cover. Reduced stream or spring flows could adversely affect forage production on a given allotment and cause overgrazing close to existing water sources.

For the purposes of this EIS, the index for delineation of drawdown with potential effects to water sources was determined by the 10-foot or greater drawdown contour, as predicted by the groundwater model. Information related to groundwater development areas and groundwater pumping, including the methodology, assumptions, and limitations of the groundwater model developed specifically for this project, is available in Section 3.3, Water Resources. Approximately 8 springs in 2 allotments occur within the high or moderate risk areas at full build out and 210 springs

in 25 allotments and 303 springs in 34 allotments occur at full build out plus 75 years and full build out plus 200 years, respectively; 6 miles of perennial streams in 5 allotments occur within the high or moderate risk areas at full build out and 73 miles in 25 allotments and 102 miles in 32 allotments occur at full build out plus 75 years and full build out plus 200 years, respectively, as predicted by the groundwater model across all allotments (**Appendix F3.12**, **Tables F3.12-2** and **F3.12-3**). These tables show the potentially affected number of springs and miles of perennial streams at the time period related to full build out, full build out plus 75 years, and full build out plus 200 years for all pumping alternatives. If no effects were shown at full build out, the table presents only the data from the time period associated with full build out plus 200 years. The above mentioned springs are a combination of field verified and unverified types. Unverified springs typically originate from map data sources and may change over time. See **Appendix F3.12**, **Table F3.12-2** for the total number of springs affected as well as the number of affected field verified springs.

Additional effects beyond drying of streams and springs are the potential for livestock to damage remaining water sources due to the overuse of a reduced number of available water sources and impacts to wetland meadows and basin shrubland areas. **Appendix F3.12**, **Table F3.12-4** shows the acreage of wetland/meadow and basin shrubland vegetation communities within the area of potential concern at full build out (9 allotments and 17,819 acres) at full build out plus 75 years (28 allotments and 142,975 acres), and at full build out plus 200 years (32 allotments and 200,080 acres). Drawdown in these areas potentially could reduce available forage in wetland/meadow and basin shrubland areas (see Sections 3.12.1.2, 3.12.1.4 and Section 3.5, Vegetation Resources). Although beneficial upland vegetation may become established in these affected areas, this also presents an opportunity for unpalatable or less nourishing species, as well as undesirable invasive species, to become established. Based on the overall size (730,000 acres) of the potentially affected allotments within the region of study, the Wetland/Meadow and Basin Shrubland area where plant species composition could potentially change as the result of groundwater pumping would range from 2 percent at full build out; 20 percent at full build out plus 75 years; and 27 percent at full build out plus 200 years. Depending on the rates of vegetation species composition change, it may be necessary to re-evaluate livestock stocking rates over the long time periods. The potential for reductions in animal unit months and overall carrying capacities for affected allotments as a result of groundwater drawdown will need to be analyzed in future NEPA. As discussed below, there may be opportunities to offset forage value change by rangeland improvements, and provision of more surface water in selected locations to improve livestock distribution and forage use. The COM Plan, as described in Section 3.20, would be developed and implemented to protect vegetation resources from groundwater pumping activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The ACMs that are part of the COM Plan are described below.

ACMs would offset some impacts from drawdown in grazing allotments. Measures identified as part of the applicant's Adaptive Management Plan are listed below.

- ACM C.2.15: Modify use of SNWA's agricultural water rights in Spring Valley (i.e., changing crops, watering cycles, diverting saved water to the wet meadow areas) to offset changes in spring discharges needed to maintain wet meadow areas in other Spring Valley areas.
- ACM C.2.19: Utilize conservation and protection non-use on BLM grazing allotments on which SNWA holds grazing permits for the purposes of: 1) protecting the land and its resources from destruction or unnecessary injury; 2) improving rangeland conditions; or 3) enhancing resource values, uses, or functions (in accordance with guidelines set forth in BLM IM 2009-057).
- ACM C.2.21: Conduct facilitated recharge projects to offset local groundwater drawdown to benefit sensitive biological areas.

Conclusion. Flow reductions in streams and springs could occur where those streams and springs occur in an area of moderate to high risk (determined by their location within the area of greater than 10 feet of drawdown and occurrence in the valley floors and valley margins). Groundwater-dependent water features (natural and man-made) in those areas potentially could be impacted. In addition, there is the potential for livestock to damage remaining water sources and the wetland meadows and phreatophyte areas that typically surround them due to the overuse of a reduced number of available water sources. While there may be a decline in carrying capacity in the ET areas (Wetland/Meadow and Basin Shrubland) as the result of groundwater pumping, there are opportunities over the long term to conduct upland

rangeland improvement projects to offset losses elsewhere, and to improve the distribution and reliability of surface water sources to improve the overall forage utilization rate.

Proposed monitoring measure:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

Proposed mitigation measures:

As described in Water Resources, Section 3.3, water resources mitigation measure GW-WR-7 would assist in avoiding or minimizing impacts to federal resources and federal water rights. Implementation of this measure would reduce potential effects to hydric soils associated with locations where federal water rights or federal water dependant resources are mitigated. Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Potential residual impacts include:

The COM Plan, ACMs, and water resources monitoring and mitigation measures could be effective in reducing impacts to livestock grazing operations. ACMs involving modification of the SNWA's agriculture water rights, utilizing conservation and protection non-use on BLM grazing allotments on which SNWA holds grazing permits, and facilitated recharge projects would be applied to reduce effects on environmental resources including surface water and forage vegetation sources. Two relevant objectives of the COM Plan to livestock grazing operations are designed to protect federal resources and water rights. Long-term potential for loss of forage vegetation production and quality may reduce the carrying capacity of affected grazing allotments. It is not possible to determine the level of impact reduction at this time. Effects on livestock grazing operations could exist after mitigation measures are applied, especially considering the potential long recovery period that could occur. Some unavoidable impacts to livestock grazing could occur at some locations.

3.12.2.10 Alternatives A through F

Groundwater Development Area

The impacts to grazing and rangelands that could result from construction, operation, and maintenance of groundwater development areas for Alternatives A through F are summarized in **Table 3.12-15**.

Table 3.12-15 Summary of Grazing and Rangeland Impacts, Proposed Mitigation, and Residual Effects, Alternatives A through F, Groundwater Development

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Construction, Operation, and Maintenance					
Temporary forage production loss of 4,810 acres. 66% of disturbance area is permanent with a forage production loss of 3,170 acres. 1,640 acres being reclaimed.	Temporary forage production loss of 4,660 acres. 66% of disturbance area is permanent with a forage production loss of 3,080 acres. 1,580 acres being reclaimed.	Temporary forage production loss of 4,800 aeres. 66% of disturbanee area is permanent with a forage production loss of 3,170 acres. 1,640 aeres being reelaimed.	Temporary forage production loss of 4,000 aeres. 66% of disturbance area is permanent with a forage production loss of 2,630 acres. 1,370 acres being reclaimed. There would be no facilities loeated north of Lincoln County.	Temporary forage production loss of 4,080 acres. 66% of disturbanee area is permanent with a forage production loss of 2,680 acres. 1,400 aeres being reclaimed. There would be no facilities loeated in Snake Valley.	Temporary forage production loss of 6,620 acres. 66% of disturbance area is permanent with a forage production loss of 4,350 acres. 2,270 aeres being reelaimed. There would be no facilities located in Snake Valley.
Same residual impacts as the Proposed Action	Same residual impacts as the Proposed Aetion.	Same residual impaets as the Proposed Action.	Same residual impaets as the Proposed Aetion.	Same residual impaets as the Proposed Action.	Same residual impacts as the Proposed Action.
COM Plan					
• The COM Plan would be developed and implemented to protect rangeland resources from groundwater development activities. The COM Plan would integrate proteetive measures from the following: BLM RMP management aetions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS.					
Recommended Mitigation					
• **ROW-AQ-2 (Alternative Duct Control)**, **ROW-VEG-1 (Green Stripping)**, **ROW-GRA-1 (Temporary Fencing in Livestock High Use Areas)**, and **GW-WL-1 (Avoid Siting Facilities in Big Game Habitats)** would be applied to these alternatives, as deseribed for the Proposed Action.					
Potential Residual Impacts					
• Temporary and permanent loss of forage associated with construetion and maintenance aetivities and permanent facilities. • Short- and long-term potential for livestoek injury or death due to construction and maintenance aetivities. • Short-term potential for concentrated grazing resulting in soil compaction and overgrazed vegetation. • Temporary removal of, or damage to, rangeland improvements.					

Groundwater Pumping

The impacts of pumping on grazing and rangelands for Alternatives A through F and No Action are summarized in **Table 3.12-16**.

Table 3.12-16 Summary of Pumping Impacts for Alternatives A through F

Parameter	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	No Action
Springs within Grazing Allotments[1] (three model periods)	3, 118, 180	41, 156, 259	3, 63, 94	1, 41, 121	3, 55, 104	5, 131, 203	28, 46, 86
Miles of Perennial Streams within Grazing Allotments (three model periods)	1, 52, 72	3, 78, 105	1, 37, 50	0, 5, 39	1, 6, 20	1, 21, 41	7, 19, 52
Wetland Meadow and/or Basin Shrubland Forage Quality Reductions within Grazing Allotments[2] (three model periods)	12,150, 111,564, 130,378	18,745, 103,467, 156,713	12,150, 45,413, 53,799	18,245, 18,245, 85,811 Groundwater pumping would only occur in Lincoln County.	12,150, 73,977, 87,224 There would be no groundwater pumping in Snake Valley.	8,357, 92,145, 136,110 There would be no groundwater pumping in Snake Valley.	10,595, 32,490, 43,460

COM Plan

- The COM Plan would be developed and implemented to protect rangeland resources from groundwater development activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS.

Recommended Monitoring

- As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

Recommended Mitigation

- As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Potential Residual Impacts

- The COM Plan, ACMs, and water resources monitoring and mitigation measures could be effective in reducing impacts to livestock grazing operations. ACMs involving modification of the SNWA's agriculture water rights, utilizing conservation and protection non-use on BLM grazing allotments on which SNWA holds grazing permits, and facilitated recharge projects would be applied to reduce effects on environmental resources including surface water and forage vegetation sources. Two relevant objectives of the COM Plan to livestock grazing operations are designed to protect federal resources and water rights. Long-term potential for loss of forage vegetation production and quality may reduce the carrying capacity of affected grazing allotments. It is not possible to determine the level of impact reduction at this time. Effects on livestock grazing operations could exist after mitigation measures are applied, especially considering the potential long recovery period that could occur. Some unavoidable impacts to livestock grazing could occur at some locations.

[1] Springs listed include both field-verified and -unverified springs. See **Appendix F3, Table F3.12-2** for impacts specific to field verified springs.

[2] This refers to basin shrubland and wetland/meadow ET unit vegetation cover types. See Proposed Action – Groundwater Pumping for a description of vegetation transitions.

3.12.2.11 No Action

Groundwater Development Area

Under the No Action Alternative the project would not be constructed and there would be no maintenance. There would be no surface impacts to vegetation or affects to livestock grazing. Current environmental conditions would continue to influence the landscape and current land management objectives and activities would provide guidance.

Groundwater Pumping

The types of impacts to springs, streams, and wetland/meadow and basin shrubland (ET unit) forage reductions associated with groundwater drawdown, due to existing pumping activities, would be similar to the Proposed Action. **Appendix F3.12**, **Tables F3.12-2** through **F3.12-4** present numbers for springs, streams, and ET unit areas contained within high or moderate risk areas for all alternatives. **Table 3.12-16** provides a summary of potential impacts to these resources for the No Action Alternative.

Conclusion. Model simulations predicted that current groundwater pumping would have drawdown effects of 10-foot or greater primarily in Lincoln County. Similar vegetation composition changes as those discussed under the Proposed Action could occur due to a reduction of available soil moisture. At full build out plus 200 years, modeling predict that 86 springs, 53 miles of perennial streams, and 43,460 acres of wetland/meadow and basin shrubland ET areas could be affected.

3.12.3 Cumulative Impacts

3.12.3.1 Impacts Common to All Alternatives

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Rangelands and Grazing

Changes in climate are currently impacting landscapes of the Southwest and this trend is projected to increase in the coming decades. Higher temperatures, increased drought, and more intense thunderstorms will very likely decrease the cover of vegetation that protects the ground surface, increase erosion, and promote invasion of exotic grass species in arid landscapes. Climate change will also likely create physical conditions conducive to wildfire, including the proliferation of exotic grasses, thus causing fire frequencies to increase. In areas such as the Mojave Basin ecoregion which has not coevolved with fire, the probability of loss of iconic, charismatic megaflora such as Joshua trees is very likely. In addition, river and riparian ecosystems in the GWD Project area will very likely be negatively impacted by decreased stream flow, increased water removal, and greater competition from non-native species (Ryan et al. 2008).

Climate change could affect rangelands and grazing in the GWD Project area by impacting:

- Temperature and atmospheric CO_2: while some forage species may have positive responses to elevated CO_2 and lower levels of warming, higher levels of warming may negatively affect growth and yields of rangeland plants.
- Precipitation: extreme events such as heavy downpours and droughts are likely to reduce forage yields because excesses or deficits of water have negative impacts on plant growth.
- Invasive species: weeds, diseases, and insect pests benefit from warming and weeds also benefit from a higher CO_2 concentration, increasing stress on crop plants and requiring more attention to pest and weed control.
- Forage: quality in pasture and rangeland generally declines with increasing CO_2 concentration because of the effects on plant nitrogen and protein content, reducing the land's ability to supply adequate livestock feed.

3.12.3.2 Issues

Rights-of-way and Groundwater Development Area Construction and Facility Maintenance

- Temporary reduction of grazing forage production due to surface disturbance. Permanent reduction of grazing forage production due to permanent surface disturbance for roads and facilities.
- Loss of, or injury to, livestock due to open trenches and fences.
- Effects to livestock movement due to staging of pipeline and power line equipment.
- Impacts to rangeland improvements.
- Animal-vehicle collisions.

Groundwater Pumping

- Potential effects of groundwater pumping on water source availability for livestock.
- Effects of groundwater drawdown on forage production due to loss of, or changes to, vegetation production or composition (see Section 3.5, Vegetation Resources).

3.12.3.3 Assumptions

Rights-of-way and Groundwater Development Area Construction and Facility Maintenance

- The study area is the proposed ROW surface disturbance area for pipelines, power lines, aboveground facilities, and access roads for each project alternative plus the total surface disturbance area including well pads, gathering lines, power lines, and access roads for groundwater development. For groundwater development areas, the existence of past, present, and reasonably foreseeable actions within the groundwater development area boundary within each hydrographic basin was used for evaluating potential cumulative effects.
- PPA footprints based on utility ROWs and other surface disturbing activities have been identified in BLM and other databases.

Groundwater Pumping

- The water resources region of study area is the boundary for the groundwater model simulation.
- Time frame effects range from full build out of the project to full build out plus 200 years.
- Springs and streams are high value areas and impacts to them need to be qualified or, where possible, quantified as the best means for determining impacts to livestock grazing.
- A groundwater depth of 50 feet or deeper in relation to the ground surface elevation is not accessible to the roots of nearly all phreatophytic shrubs, and this groundwater depth represents a reasonable boundary for: 1) estimating the deepest root zone extent of plant communities that are at least partially dependent on underlying groundwater; and 2) defining a groundwater drawdown boundary that assumes that the roots of overlying plant communities no longer have access to groundwater as a moisture source at depths greater than 50 feet.
- ET units mapped as Wetland/Meadow and Basin Shrubland cover types represent the primary cover types that would be affected by drawdown effects.
- An index drawdown contour of 10 feet is assumed to be a reasonable estimate of the point at which long-term changes to vegetation community vigor and composition would begin to appear (see Section 3.5, Vegetation Resources, for greater detail on the anticipated changes in response to drawdown).

3.12.3.4 Methodology for Analysis

Rights-of-way and Groundwater Development Area Construction and Facility Maintenance

- The cumulative surface disturbance effects to vegetation communities by hydrographic basin were estimated by overlaying the existing surface disturbances for PPAs, RFFAs, and the development areas for the project alternative being evaluated. The estimated cumulative surface disturbance was then compared with the overall area of the hydrographic basin affected. Potential effects on vegetation communities that occupy relatively small areas within individual basins, such as wetlands, were considered.
- Estimate of change to livestock carrying capacity and management in grazing allotments based on short- and long-term displacement of, and effects on, forage production for impacted allotments.
- Projects considered as past and present activities and RFFAs were compiled from the Geocommunicator.gov website hosting LR2000 data. Types of projects for past and present activities and RFFAs include ROWs (telephone, fiber optic, pipelines, power lines, roads, railroads, and other utility corridors), geothermal, wind, and solar energy, agriculture, vegetation treatments, recent fires, and mining activities. Utility corridors are considered part of past and present activities and were removed from RFFA analysis. More information regarding past and present and reasonably foreseeable future actions is located in Chapter 2, Section 2.9.

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Groundwater Pumping

- Wetland/Meadow and Basin Shrubland. The area enclosed by the maximum extent of the 10-foot drawdown contour was superimposed over the area of the primary ET areas (Wetland/Meadow, Basin Shrubland cover types) to calculate the area of vegetation that could experience reductions in soil moisture and long-term vegetation community composition changes caused by groundwater drawdown of 10 feet or more at different points in time (full build out, full build out plus 75 years, and full build out plus 200 years). Figures were generated that illustrate the expansion of the 10-foot and greater drawdown contours over time in relation to the vegetation communities within the hydrographic ET boundaries.

- Identification of water supplies within grazing allotments that occur within the water resources region of study as determined by the 10 foot or greater drawdown contour predicted by the groundwater model and areas of high and moderate risk. Information related to groundwater development areas and groundwater pumping; including the methodology, assumptions, and limitations of the CCRP groundwater model developed specifically for this project; is available in Section 3.3, Water Resources.

- Springs and perennial stream reaches. The 10-foot drawdown index was applied to the springs and perennial stream reaches that were classified as being at risk from being affected by groundwater drawdown (Section 3.3, Water Resources). The springs included for analysis were those rated as presenting a "high" or "moderate" risk of effects. The number of springs and miles of perennial stream reaches potentially affected were enumerated for each alternative over time from the modeling results.

3.12.3.5 No Action

Rights-of-way and Groundwater Development

Under the No Action Alternative the project would not be constructed and there would be no maintenance. There would be no surface impacts to vegetation or effects to livestock grazing. Current environmental conditions would continue to influence the landscape and current land management objectives and activities would provide guidance.

Surface impacts would be compounded by recent projects that have not yet been reclaimed and those projects that are likely to occur in the foreseeable future (Chapter 2). These impacts could further reduce the amount of forage and disturb normal livestock movement patterns. As the majority of the projects that are projected to occur in the future are related to power production or conveyance, additional surface disturbance is anticipated to be minimal. For more information regarding past and present and reasonably foreseeable future actions see Chapter 2, Section 2.9.

Groundwater Pumping

Existing and other proposed groundwater pumping projects are anticipated to go forward, resulting in an extension of the water resources region of study (within the 10-foot and greater drawdown area identified by the groundwater model). The types of potential impacts to springs, streams, and wetland/meadow and basin shrubland (ET areas) forage reductions associated with groundwater drawdown, due to existing and proposed pumping activities, would be the similar to the Proposed Action. **Table F3.12.5** presents numbers for springs, streams and ET unit areas contained within the 10-foot or greater drawdown boundary for the cumulative effects related to all alternatives. This represents current trends based on environmental conditions and land management objectives and activities. The majority of the effects to wetland/meadow and basin shrubland vegetation would occur in the Wilson Creek-01201 allotment. **Table 3.12-17** and **Appendix F3.12**, **Table F3.12-5** and the following information summarize the incremental expansion of the groundwater drawdown area over time in relation to surface water sources and possible reductions to forage vegetation for rangeland resources.

Full Build Out. The 10-foot drawdown area overlaps with 17 grazing allotments. The Becky Springs, Cherry Creek, and Geyser Ranch allotments contain more than 1,000 acres of wetland/meadow and basin shrubland vegetation potentially at risk.

Full Build Out Plus 75 Years. The 10-foot drawdown area overlaps with 23 grazing allotments. The Becky Springs, Cherry Creek, Comet, Geyser Ranch, and Private-A allotments contain more than 1,000 acres of wetland/meadow and basin shrubland vegetation potentially at risk.

Full Build Out Plus 200 Years. The 10-foot drawdown area overlaps with 31 grazing allotments. The Becky Springs, Cherry Creek, Closed-A, Comet, Douglas Point, Geyser Ranch, and Private-A allotments contain more than 1,000 acres of wetland/meadow and basin shrubland vegetation potentially at risk.

Table 3.12-17 Summary of Potential Cumulative Pumping Effects with the No Action on Rangeland Resources

Parameter	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs within Grazing Allotments[1]	44	78	116
Miles of Perennial Streams within Grazing Allotments	24	37	72
Acres of Wetland/Meadow and Basin Shrubland Vegetation within Grazing Allotments[2]	23,461	49,198	62,292

[1] Springs listed include both field-verified and -unverified springs. See **Table F3.12-2** for impacts specific to field verified springs.
[2] This refers to wetland/meadow and basin shrubland ET unit vegetation cover types.

3.12.3.6 Proposed Action

Rights-of-way and Groundwater Development

Surface disturbance impacts to grazing allotments have resulted from recent projects that may have not yet been reclaimed. These impacts would combine with the GWD Project and other RFFAs (Chapter 2, Section 2.9). These disturbances could further reduce the amount of forage and disturb normal livestock movement patterns. The Proposed Action surface disturbance would overlap with three RFFAs. The Wilson Creek Wind Project transmission lines would utilize the LCCRDA corridor in Lake and Dry Lake valleys where ROWs for the GWD Project could be co-located. The Spring Valley Wind Project would overlap with a ground water development area in Spring Valley. The ON Transmission Line Project would share the same utility corridor with ground water development facilities in Cave, Dry Lake, Delamar, Pahranagat, Coyote Springs, Hidden, and Garnet valleys. The Proposed Action surface disturbance is estimated to be between 15,833 and 20,568 acres. Reasonably foreseeable future actions would be approximately 4,340 acres. Until restoration is complete, this would fragment the existing vegetation communities and cause a reduction in forage production. For more information regarding PPAs and RFFAs see Section 3.12.3.3 and Chapter 2, Section 2.9.

Groundwater Pumping

Several of the grazing allotments within the region of study would be affected by cumulative groundwater drawdown, as predicted by the 10-foot or greater drawdown contour of the groundwater model. The model analysis predicted 50 allotments are at risk of impacts to forage vegetation at the time frame associated with full build out plus 200 years. Information related to groundwater development areas and groundwater pumping; including the methodology, assumptions, and limitations of the CCRP groundwater model developed specifically for this project; is available in Section 3.3, Water Resources. Forage impacts primarily would occur in wetland/meadow and basin shrubland vegetation types as these are reliant on groundwater. These vegetation types are valuable sources of forage for livestock due to the nourishment they provide and the time of year they are utilized (see Section 3.12.1.2). As these vegetation types experience the effects of groundwater drawdown they will likely be replaced by upland plant communities. These communities may be beneficial for livestock grazing, but there is also a chance that undesirable species (less palatable, nourishing, or available) or invasive species could become established and reduce the quantity and/or quality of available livestock forage (see Section 3.12.1.4 and Section 3.5, Vegetation Resources, for more information on vegetation transitions). Drawdown effects to springs and streams could include reduced flow rates or complete lack of discharge. This would not only decrease the amount of water available for livestock but may also concentrate grazing pressure into areas where water remains available. The result of this could include excessive stream bank erosion (and by extension increased water turbidity), soil compaction and areas of over grazing. The largest majority of these affected allotments are located in Spring Valley. **Table 3.12-18** and **Appendix F3.12**, **Tables F3.12.2** through **F3.12-5** and the following information summarize the effects of cumulative pumping for the Proposed Action on surface water sources and wetland/meadow and basin shrubland vegetation for rangelands. At full build out plus 75 years and full build out plus 200 years, the incremental contribution of pumping effects for the Proposed Action Alternative is approximately 75 percent for springs (both field verified and unverified) and 60 percent for perennial streams (see **Figures 3.12-2** and **3.12-3**). This percentage is based on the relative contribution of Proposed Action pumping to No

Action and other cumulative pumping. In Snake and Spring valleys, Proposed Action pumping contributes most of the incremental effects to cumulative drawdown impacts on water and food sources for grazing allotments.

Full Build Out. The 10-foot drawdown area overlaps with 25 grazing allotments. The Cherry Creek, Geyser Ranch, and South Spring Valley allotments contain more than 5,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 20 percent of the potential cumulative impacts to springs and streams is the result of the Proposed Action pumping. Approximately 38 percent of the potential cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of the Proposed Action pumping.

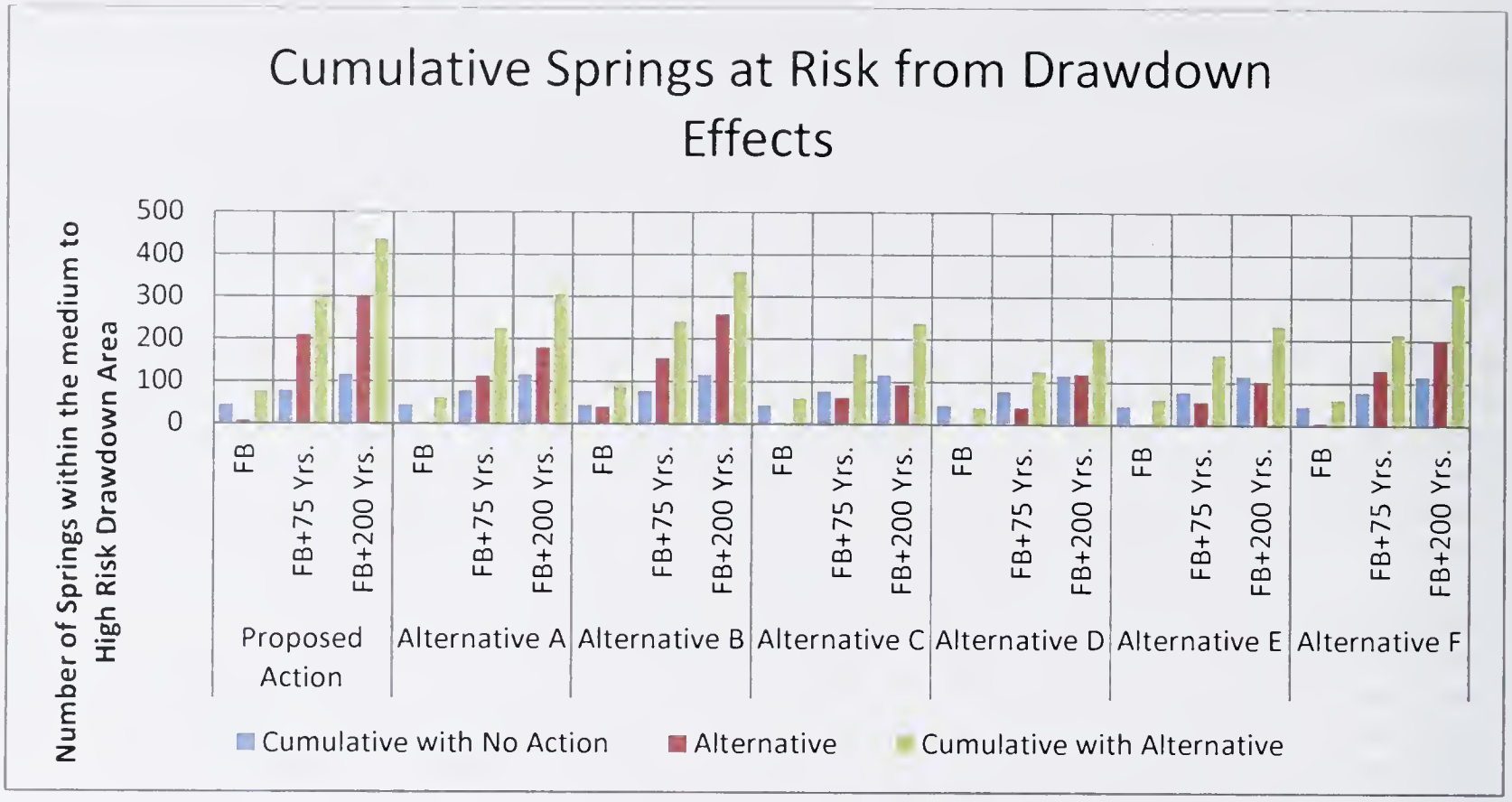
Full Build Out Plus 75 Years. The 10-foot drawdown area overlaps with 52 grazing allotments. The Baker, Bastian Creek, Cherry Creek, Chokecherry, Geyser Ranch, Knoll Springs, Majors, Muncy Creek, Scotty Meadows, Smith Creek, South Spring Valley, and Willow Spring allotments contain more than 5,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 66 percent of the potential cumulative impacts to springs and streams is the result of the Proposed Action pumping. Approximately 73 percent of the potential cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of the Proposed Action pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area overlaps with 59 grazing allotments. The Baker, Cherry Creek, Geyser Ranch, Muney Creek, Scotty Meadows, South Spring Valley, and Willow Spring allotments contain more than 10,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 70 percent of the potential cumulative impacts to springs and streams is the result of the Proposed Action pumping. Approximately 87 percent of the potential cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of the Proposed Action pumping.

Table 3.12-18 Summary of Potential Cumulative Pumping Effects with the Proposed Action on Rangeland Resources

Parameter	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs within grazing allotments[1]	77	297	437
Miles of Perennial Streams within Grazing Allotments	32	119	176
Acres of Wet/Meadow and Basin Shrubland Vegetation within Grazing Allotments[2]	46,562	196,202	229,159

[1] Springs listed include both field-verified and -unverified springs. See **Table F3.12-2** for impacts specific to field verified springs.
[2] This refers to wetland/meadow and basin shrubland ET unit vegetation cover types.



[1] Includes both field-verified and -unverified springs. Unverified springs originate from map data sources and may change over time. Verified streams have been inventoried through field surveys.

Figure 3.12-2 Incremental Contribution of the Proposed Action and All Alternatives on Springs in Moderate to High Risk Areas

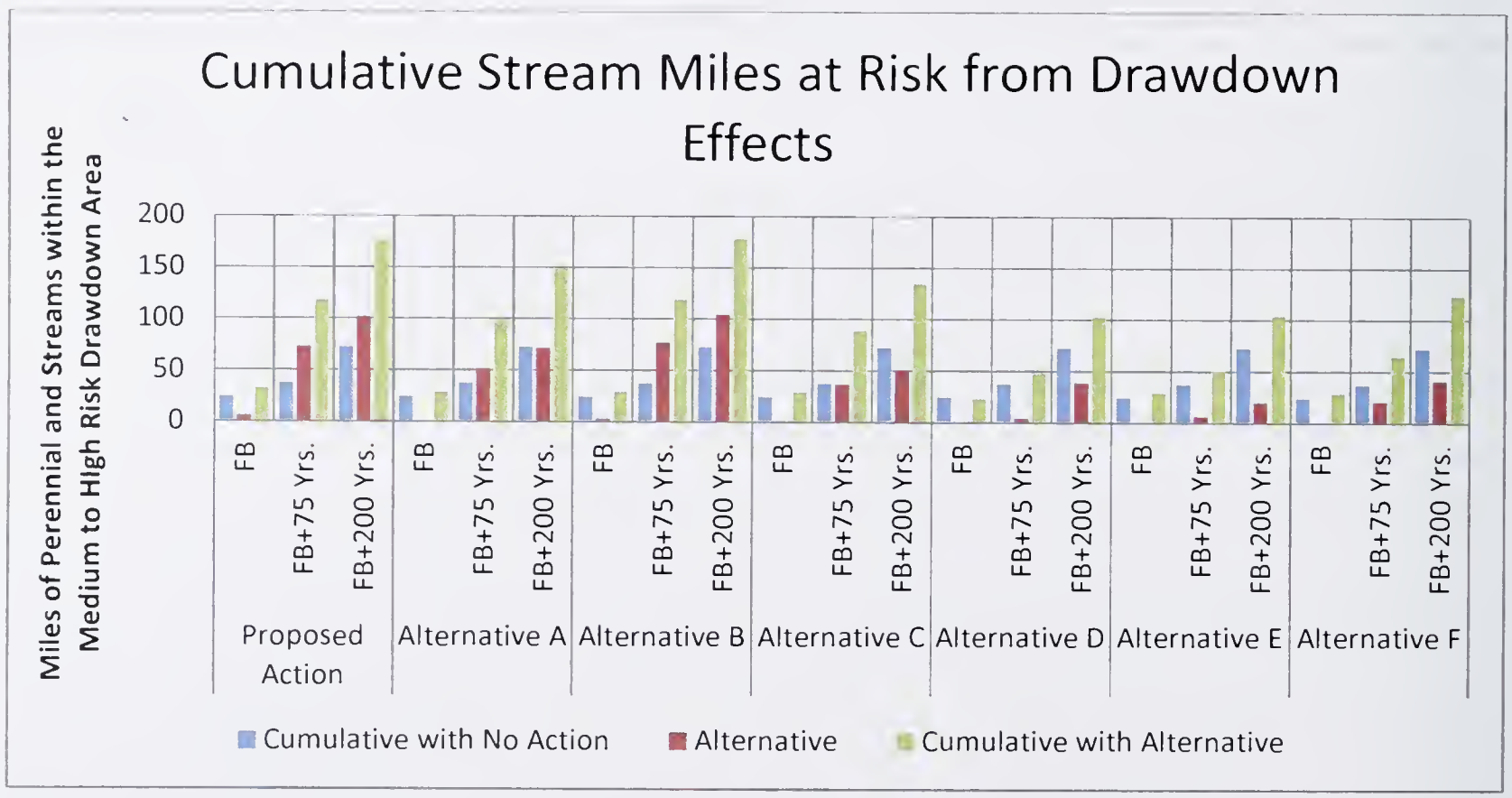


Figure 3.12-3 Incremental Contribution of the Proposed Action and All Alternatives on Perennial Streams in Moderate to High Risk Areas

3.12.3.7 Alternative A

Rights-of-way and Groundwater Development

Surface impacts from this and present and foreseeable actions would be the same in nature as for the Proposed Action. Alternative A surface disturbance is estimated to be between 14,338 and 17,035 acres. Overlap with foreseeable future projects would be the same as for the Proposed Action. Until restoration is complete, this would fragment the existing vegetation communities and cause a reduction in forage production. For more information regarding past and present and reasonably foreseeable future actions see Section 3.12.3.3 and Chapter 2, Section 2.9.

Groundwater Pumping

Several of the grazing allotments within the region of study would be affected by cumulative groundwater drawdown. Based on the drawdown risk analysis; 61 are at risk of impacts to forage vegetation at the time frame associated with full build out plus 200 years (for information related to the groundwater model developed specifically for this project see Section 3.3, Water Resources). Drawdown impacts to springs, streams, and wetland/meadow and basin shrubland vegetation would be similar in nature as for the Proposed Action (see Section 3.12.3.5). The largest majority of these affected allotments are located in Spring Valley. **Table 3.12-19,** and **Appendix F3.12**, **Table F3.12-5** and the following information summarize the effects of cumulative pumping for Alternative A on surface water sources and forage vegetation for rangeland. At full build out plus 75 years and full build out plus 200 years the incremental contribution of pumping effects for Alternative A is approximately 50 to 60 percent for springs (both field verified and unverified) and 50 percent for perennial streams (**Figures 3.12-2** and **3.12-3**). In Snake and Spring valleys, Alternative A pumping contributes most of the incremental effects to cumulative drawdown impacts on water and food sources for grazing allotments.

Full Build Out. The 10-foot drawdown area overlaps with 24 grazing allotments. The Bastian Creek, Becky Springs, Cherry Creek, Geyser Ranch, Majors, Scotty Meadows, South Spring Valley, and Willard Creek allotments contain more than 1,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 7 percent of the cumulative impacts to springs and streams is the result of Alternative A pumping. Approximately 30 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative A pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area of effect overlaps with 47 grazing allotments. The Baker, Cherry Creek, Chokecherry, Geyser Ranch, Majors, Muncy Creek, Scotty Meadows, Smith Creek, South Spring Valley, and Willow Springs allotments contain more than 5,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 50 percent of the cumulative impacts to springs and streams is the result of Alternative A pumping. Approximately 67 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative A pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area of effect overlaps with 56 grazing allotments. The Cherry Creek, Geyser Ranch, Muncy Creek, Scotty Meadows, South Spring Valley, and Willow Springs allotments contain more than 10,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 60 percent of the cumulative impacts to springs and 50 percent to streams are the result of Alternative A pumping. Approximately 69 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative A pumping.

Table 3.12-19 Summary of Potential Cumulative Pumping Effects with Alternative A on Rangeland Resources

Parameter	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs within grazing allotments[1]	62	227	307
Miles of Perennial Streams within grazing allotments	29	99	149
Acres of Wetland/Meadow and Basin Shrubland Vegetation within grazing allotments[2]	40,959	165,666	189,601

[1] Springs listed include both field-verified and -unverified springs. See **Table F3.12-2** for impacts specific to field verified springs.

[2] This refers to wetland/meadow and basin shrubland ET unit vegetation cover types.

3.12.3.8 Alternative B

Rights-of-way and Groundwater Development

Expected cumulative effects of Alternative B would be the same as described for Alternative A. It is not expected that Alternative B would contribute any additional cumulative surface disturbance effects to rangelands or livestock grazing. Alternative B surface disturbance would be approximately 16,861 acres. Overlap with foreseeable future projects would be the same as for the Proposed Action. Until restoration is complete, this would fragment the existing vegetation communities and cause a reduction in forage production. For more information regarding past and present and reasonably foreseeable future actions see Section 3.12.3.3 and Chapter 2, Section 2.9.

Groundwater Pumping

Several of the grazing allotments within the region of study would be affected by cumulative groundwater drawdown. Based on the drawdown risk analysis, 62 are at risk of impacts to forage vegetation at the time frame associated with full build out plus 200 years (for information related to the groundwater model developed specifically for this project see Section 3.3, Water Resources). The types of drawdown impacts to springs, streams, and wetland/meadow and basin shrubland vegetation would be similar in nature as discussed for the Proposed Action (see Section 3.12.3.5). The largest majority of these affected allotments are located in Spring Valley. **Table 3.12-20** and **Appendix F3.12**, **Table F3.12-5** and the following information summarize effects of cumulative pumping for Alternative B on surface water sources and forage vegetation for rangeland. At full build out plus 75 years and full build out plus 200 years the incremental contribution of pumping effects for Alternative B is approximately 60-70 percent for springs (both field verified and unverified) and 50 to 60 percent for perennial streams (**Figures 3.12-2** and **3.12-3**). In Snake and Spring valleys, Alternative B pumping contributes most of the incremental effects to cumulative drawdown impacts on water and food sources for grazing allotments.

Full Build Out. The 10-foot drawdown area overlaps with 24 grazing allotments. The Bastian Creek, Becky Springs, Cherry Creek, Cleveland Ranch, Geyser Ranch, Majors, Negro Creek, Scotty Meadows, and Willow Springs allotments contain more than 1,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 52 percent of the cumulative impacts to springs and 26 percent to streams are the result of Alternative B pumping. Approximately 39 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative B pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area overlaps with 46 grazing allotments. The Bastian Creek, Cherry Creek, Chokecherry, Geyser Ranch, Majors, Scotty Meadows, Smith Creek, South Spring Valley, and Willow Springs allotments contain more than 5,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 67 percent of the cumulative impacts to springs and streams is the result of Alternative B pumping. Approximately 64 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative B pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area overlaps with 56 grazing allotments. The Cherry Creek, Geyser Ranch, Scotty Meadows, South Spring Valley, and Willow Springs allotments contain more than 10,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 69 percent of the cumulative impacts to springs and streams is the result of Alternative B pumping. Approximately 85 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative B pumping.

Table 3.12-20 Summary of Potential Cumulative Pumping Effects with Alternative B on Rangeland Resources

Parameter	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs within grazing allotments[1]	96	243	360
Miles of Perennial Streams within grazing allotments	29	119	178
Acres of Wetland/Meadow and Basin Shrubland Vegetation within grazing allotments[2]	48,439	161,778	183,815

[1] Springs listed include both field-verified and -unverified springs. See **Table F3.12-2** for impacts specific to field verified springs.

[2] This refers to wetland/meadow and basin shrubland ET unit vegetation cover types.

3.12.3.9 Alternative C

Rights-of-way and Groundwater Development

Expected cumulative effects of Alternative C would be the same as described for Alternative A. It is not expected that Alternative C would contribute any additional cumulative surface disturbance effects to rangelands or livestock grazing. Alternative C surface disturbance is estimated to be between 14,338 and 17,035 acres. Overlap with foreseeable future projects would be the same as for the Proposed Action. Until restoration is complete, this would fragment the existing vegetation communities and cause a reduction in forage production. For more information regarding past and present and reasonably foreseeable future actions see Section 3.12.3.3 and Chapter 2, Section 2.9.

Groundwater Pumping

Several of the grazing allotments within the region of would be affected by cumulative groundwater drawdown. Based on the drawdown risk analysis; 60 are at risk of impacts to forage vegetation at the time frame associated with full build out plus 200 years (for information related to the groundwater model developed specifically for this project see Section 3.3, Water Resources). Drawdown impacts to springs, streams, and wetland/meadow and basin shrubland vegetation would be similar in nature as for the Proposed Action (Section 3.12.3.5). The largest majority of these affected allotments are located in Spring Valley. **Table 3.12-21** and **Appendix F.12**, **Table F3.12-5** and the following information summarize effects of cumulative pumping with Alternative C on surface water sources and forage vegetation for rangeland. The incremental contribution of Alternative C pumping on the cumulative effects to springs and streams is less than the Proposed Action or Alternatives A and B. At full build out plus 75 years and full build out plus 200 years the incremental contribution of pumping effects is approximately 40 percent for springs (both field verified and unverified) and perennial streams (see **Figures 3.12-2** and **3.12-3**). In Snake and Spring valleys, Alternative C pumping contributes most of the incremental effects to cumulative drawdown impacts on water and food sources for grazing allotments.

Full Build Out. The 10-foot drawdown area overlaps with 24 grazing allotments. The Bastian Creek, Becky Springs, Cherry Creek, Geyser Ranch, Majors, Scotty Meadows, South Spring Valley, and Willard Creek allotments contain more than 1,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 7 percent of the cumulative impacts to springs and streams are the result of Alternative C pumping. Approximately 30 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative C pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area overlaps with 46 grazing allotments. The Cherry Creek, Geyser Ranch, and South Spring Valley allotments contain more than 5,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 40 percent of the cumulative impacts to springs and streams is the result of Alternative C pumping. Approximately 45 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative C pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area overlaps with 55 grazing allotments. The Cherry Creek, Geyser Ranch, and South Spring Valley allotments contain more than 10,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 38 percent of the cumulative impacts to springs and streams is the result of Alternative C pumping. Approximately 41 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative C pumping.

Table 3.12-21 Summary of Potential Cumulative Pumping Effects with Alternative C on Rangeland Resources

Parameter	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs within grazing allotments[1]	62	168	239
Miles of Perennial Streams within grazing allotments	29	89	135
Acres of Wetland/Meadow and Basin Shrubland Vegetation within grazing allotments[2]	40,959	101,782	129,838

[1] Springs listed include both field-verified and -unverified springs. See **Table F3.12-2** for impacts specific to field verified springs.
[2] This refers to wetland/meadow and basin shrubland ET unit vegetation cover types.

3.12.3.10 Alternative D

Rights-of-way and Groundwater Development

Expected cumulative effects of Alternative D would be less than described for Alternative A. Alternative D eliminated construction in White Pine County. Alternative D surface disturbance is estimated to be between 11,313 and 12,779 acres. Overlap with foreseeable future projects would be the same as for the Proposed Action with the exception of Spring Valley, which would see no surface disturbing activity. Until restoration is complete, this would fragment the existing vegetation communities and cause a reduction in forage production. For more information regarding past and present and reasonably foreseeable future actions see Section 3.12.3.3 and Chapter 2, Section 2.9.

Groundwater Pumping

Several of the grazing allotments within the region of study would be affected by cumulative groundwater drawdown. Based on the drawdown risk analysis; 43 are at risk of impacts to forage vegetation at the time frame associated with full build out plus 200 years (for information related to the groundwater model developed specifically for this project see Section 3.3, Water Resources). The types of drawdown impacts to springs, streams, and wetland/meadow and basin shrubland vegetation would be similar in nature as for the Proposed Action (see Section 3.12.3.5). The largest majority of these affected allotments are located in Spring Valley. **Table 3.12-22** and **Appendix F3.12**, **Table F3.12-5** and the following information summarize effects of cumulative pumping for Alternative D on surface water sources and forage vegetation for rangeland. The incremental contribution of Alternative D pumping on the cumulative effects to springs and streams is less than the Proposed Action or Alternatives A and B. The percentage of contribution to impacts increases throughout the 3 model time frames assessed, but range from 30 to 60 percent of the cumulative impacts to springs (both field verified and unverified). Impacts to perennial streams are minor until full build out plus 200 years when they account for 38 percent of the cumulative effects to streams (**Figures 3.12-2** and **3.12-3**).

Full Build Out. The 10-foot drawdown area overlaps with 15 grazing allotments. The Becky Springs, Cherry Creek, and Geyser Ranch allotments contain more than 1,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 23 percent of the cumulative impacts to springs and 0 percent to streams are the result of Alternative D pumping. None of the cumulative impacts to wetland/meadow and basin shrubland vegetation are the result of Alternative D pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area overlaps with 27 grazing allotments. The Cherry Creek, Geyser Ranch, and South Spring Valley allotments contain more than 5,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 32 percent of the cumulative impacts to springs and less than 10 percent to streams are the result of Alternative D pumping. Approximately 24 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative D pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area overlaps with 38 grazing allotments. The Cherry Creek, Geyser Ranch, South Spring Valley, and Willow Springs allotments contain more than 10,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 60 percent of the cumulative impacts to springs and 38 percent to streams are the result of Alternative D pumping. Approximately 72 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative D pumping.

Table 3.12-22 Summary of Potential Cumulative Pumping Effects with Alternative D on Rangeland Resources

Parameter	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs within grazing allotments[1]	41	127	201
Miles of Perennial Streams within grazing allotments	23	48	103
Acres of Wetland/Meadow and Basin Shrubland Vegetation within grazing allotments[2]	17,547	75,333	119,366

[1] Springs listed include both field-verified and -unverified springs. See **Table F3.12-2** for impacts specific to field verified springs.

[2] This refers to wetland/meadow and basin shrubland ET unit vegetation cover types.

3.12.3.11 Alternative E

Rights-of-way and Groundwater Development

Expected cumulative effects of Alternative E would be less than described for Alternative A. Alternative E eliminated construction in Snake Valley. Alternative E surface disturbance is estimated to be between 12,421 and 14,683 acres. Overlap with foreseeable future projects would be the same as for the Proposed Action with the exception of Snake Valley, which would see no surface disturbing activity. Until restoration is complete, this would fragment the existing vegetation communities and cause a reduction in forage production. For more information regarding past and present and reasonably foreseeable future actions see Section 3.12.3.3 and Chapter 2, Section 2.9.

Groundwater Pumping

Several of the grazing allotments within the region of study would be affected by cumulative groundwater drawdown. Based on the drawdown risk analysis, 47 are at risk of impacts to forage vegetation at the time frame associated with full build out plus 200 years (for information related to the groundwater model developed specifically for this project see Section 3.3, Water Resources). Drawdown impacts to springs, streams, and wetland/meadow and basin shrubland would be similar in nature as for the Proposed Action (Section 3.12.3.5). The largest majority of these affected allotments are located in Spring Valley. **Table 3.12-23** and **Appendix F3.12**, **Table F3.12-5** and the following information summarize effects of cumulative pumping for Alternative E on surface water sources and forage vegetation for rangeland. The incremental contribution of Alternative E pumping on the cumulative effects to springs and streams is less than the Proposed Action or Alternatives A and B. The percentage of contribution to impacts ranges from approximately 30-45 percent of the cumulative impacts to springs (both field verified and unverified). Impacts to perennial streams are minor until full build out plus 200 years when they account for approximately 20 percent (**Figures 3.12-2** and **3.12-3**).

Full Build Out. The 10-foot drawdown area overlaps with 24 grazing allotments. The Bastian Creek, Becky Springs, Cherry Creek, Geyser Ranch, Majors, Scotty Meadows, South Spring Valley, and Willard Creek allotments contain more than 1,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 4 percent of the cumulative impacts to springs and streams is the result of Alternative E pumping. Approximately 30 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative E pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area overlaps with 32 grazing allotments. The Cherry Creek, Geyser Ranch, Majors, Muncy Creek, Scotty Meadows, South Spring Valley, and Willow Springs allotments contain more than 5,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 34 percent of the cumulative impacts to springs and 11 percent to streams is the result of Alternative E pumping. Approximately 58 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative E pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area overlaps with 42 grazing allotments. The Cherry Creek, Geyser Ranch, Muncy Creek, Scotty Meadows, South Spring Valley, and Willow Springs allotments contain more than 10,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 44 percent of the cumulative impacts to springs and 19 percent to streams are the result of Alternative E pumping. Approximately 59 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative E pumping.

Table 3.12-23 Summary of Potential Cumulative Pumping Effects with Alternative E on Rangeland Resources

Parameter	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs within grazing allotments[1]	62	167	235
Miles of Perennial Streams within grazing allotments	29	51	104
Acres of Wetland/Meadow and Basin Shrubland Vegetation within grazing allotments[2]	40,959	127,338	148,516

[1] Springs listed include both field-verified and -unverified springs. See **Table F3.12-2** for impacts specific to field verified springs.
[2] This refers to wetland/meadow and basin shrubland ET unit vegetation cover types.

3.12.3.12 Alternative F

Rights-of-way and Groundwater Development

Expected cumulative effects of Alternative F would be greater than those described for Alternative A but less than the Proposed Action. Alternative F would eliminate construction in Snake Valley. Alternative F surface disturbance is estimated to be between 13,269 and 17,087 acres. Overlap with foreseeable future projects would be the same as for the Proposed Action, with the exception of Snake Valley where there would see no surface disturbing activity. Until restoration is complete, this would fragment the existing vegetation communities and cause a reduction in forage production. For more information regarding past and present and reasonably foreseeable future actions, see Section 3.12.3.3 and Chapter 2, Section 2.9.

Groundwater Pumping

Several of the grazing allotments within the region of study would be affected by cumulative groundwater drawdown. Based on the drawdown risk analysis, 49 are at risk of impacts to forage vegetation at the time frame associated with full build out plus 200 years (for information related to the groundwater model developed specifically for this project see Section 3.3, Water Resources). Drawdown impacts to springs, streams, and wetland/meadow and basin shrubland would be similar in nature as discussed for the Proposed Action (Section 3.12.3.5). The largest majority of these affected allotments are located in Spring Valley. **Tables 3.12-24** and **Appendix F**, **F3.12-5** and the following information summarize effects of cumulative pumping for Alternative F on surface water sources and forage vegetation for rangeland resources. The incremental contribution of Alternative F pumping on the cumulative effects to springs and streams is less than the Proposed Action or Alternative B. At full build out plus 75 years and full build out plus 200 years, the percentage of contribution to impacts is approximately 60 percent of the cumulative impacts to springs (both field verified and unverified). Impacts to perennial streams at full build out plus 75 years and full build out plus 200 years accounts for approximately 30 percent (**Figures 3.12-2** and **3.12-3**).

Full Build Out. The 10-foot drawdown area overlaps with 21 grazing allotments. The Bastian Creek, Becky Springs, Cherry Creek, Geyser Ranch, Majors, Scotty Meadows, South Spring Valley, and Willard Creek allotments contain more than 1,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 8 percent of the cumulative impacts to springs and 3 percent to streams is the result of Alternative F pumping. Approximately 23 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative F pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area overlaps with 46 grazing allotments. The Bastian Creek, Cherry Creek, Geyser Ranch, Majors, Muncy Creek, Scotty Meadows, South Spring Valley, and Willow Springs allotments contain more than 5,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 60 percent of the cumulative impacts to springs and 32 percent to streams is the result of Alternative F pumping. Approximately 64 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative F pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area overlaps with 66 grazing allotments. The Cherry Creek, Geyser Ranch, Muncy Creek, Scotty Meadows, South Spring Valley, and Willow Springs allotments contain more than 10,000 acres of wetland/meadow and basin shrubland vegetation. Based on the drawdown risk analysis, approximately 60 percent of the cumulative impacts to springs and 33 percent to streams are the result of Alternative F pumping. Approximately 80 percent of the cumulative impacts to wetland/meadow and basin shrubland vegetation is the result of Alternative F pumping.

Table 3.12-24 Summary of Potential Cumulative Pumping Effects with Alternative F on Rangeland Resources

Parameter	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs within grazing allotments[1]	61	217	336
Miles of Perennial Streams within grazing allotments	29	65	124
Acres of Wetland/Meadow and Basin Shrubland Vegetation within grazing allotments[2]	37,152	145,061	171,167

[1] Springs listed include both field-verified and -unverified springs. See **Table F3.12-2** for impacts specific to field verified springs.

[2] This refers to wetland/meadow and basin shrubland ET unit vegetation cover types.

3.13 Wild Horse and Burro Herd Management Areas

3.13.1 Affected Environment

3.13.1.1 Overview

The majority of the wild horse herds within the ROWs, groundwater development areas, and water resources region of study consist of animals descended from released or escaped domestic horses including ranch, military, and draft animals. The location of the HMAs in relation to the overall water resources region of study is shown in **Figure 3.13-1**. The Sulphur herd in western Utah is an exception to this generalization. This herd exhibits some genetic traits and bloodlines thought to be descendent from the Spanish Barb horses brought to America by Spanish explorers in the 1600s (BLM 2009). Through time these bloodlines have been mixed and diluted with escaped military, ranch, and farm horses. Wild burros do not occur in the HMAs crossed by the project ROWs and therefore, are not specifically addressed in this document.

QUICK REFERENCE

AML – Appropriate Management Level

HMA – Herd Management Area

NEPA – National Environmental Protection Act

POD – Plan of Development

RMP – Resource Management Plan

ROD – Record of Decision

ROW – Right-of-Way

SR – State Route

VRM – Visual Resource Management

WMA – Wildlife Management Area

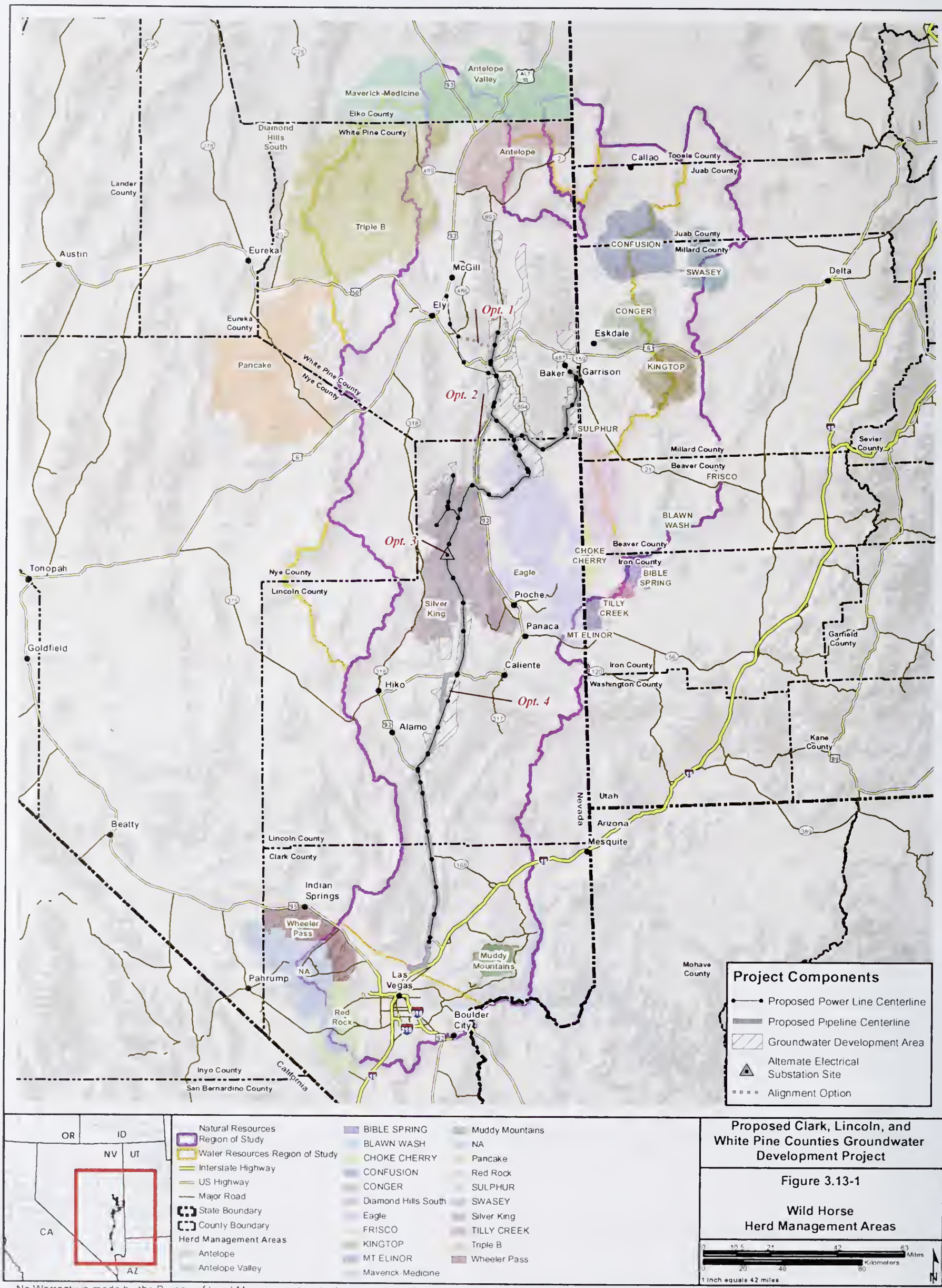
Within the water resources region of study, six HMAs are managed by the BLM Ely District in accordance with the Ely District ROD and Approved RMP (BLM 2008) and one HMA is managed by the BLM Las Vegas District. These HMAs are partially or wholly within the region of study. In the Utah portion of the region of study, eight HMAs are partially or wholly contained within the region of study (**Figure 3.13-1**).

The capacity of the habitat within each HMA to sustain a wild horse population includes consideration of adequate forage, water, space, and cover. Water must be available from natural sources on public lands; water associated with private land cannot be used to determine suitability of the area for wild horses. The number of animals that an HMA can sustain on a long-term basis is termed the AML and is expressed as a range that reflects available habitat with a built-in buffer for herd increases between gathers (wild horse roundups). **Table 3.13-1** reflects AML ranges for the two HMAs that are affected by project related surface disturbances (BLM 2007). The primary factors of the affected environment in relation to wild horses include natural surface water features, developed water sources, and forage production on public lands. Forage for horses typically consists of grasses, forbs, and tender shrubs.

3.13.1.2 Right-of-way Areas

The Eagle HMA is contained within Lake, Spring, Hamlin, Patterson, Eagle, Rose, and Dry Lake valleys. The ROWs for the Proposed Action and alternatives cross this HMA only in Lake and Spring valleys. The majority of the Silver King HMA is located in Dry Lake Valley with lesser portions occurring in Cave, Patterson, Lake, Panaca, and Pahroc valleys. The ROWs for the Proposed Action and alternatives cross this HMA only in Dry Lake and Cave valleys.

Table 3.13-1 identifies the acreage of the two HMAs (Eagle and Silver King) that intersect the project ROWs and their range of AMLs. These are the only HMAs that the ROW footprint intersects within the water resources region of study. The footprint associated with the ROWs and ancillary facilities occupies less than 1 percent of the HMA areas within the region of study.



Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.13-1

Wild Horse Herd Management Areas

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

Table 3.13-1 Herd Management Areas Overlapping the Rights-of-way and Ancillary Facilities for the Proposed Action

Nevada HMA Name	AML[1]	HMA Total Area[2]	Acreage of ROW and Ancillary Facilities within HMAs
Eagle	100-210	668,407	693
Silver King	60-128	605,631	2,322

[1]Appropriate management level; i.e., the wild horse/burro population (individuals) sustainable on a year-long basis.
[2]BLM acres.

Table 3.13-2 shows the overlap of facilities with HMAs for the Proposed Action.

Table 3.13-2 Aboveground Facilities Within Each Herd Management Area for the Proposed Action

Facility	Basin	HMA Name	Acreage
Access Road	Cave Valley	Silver King	20
Access Road	Dry Lake Valley	Silver King	88
Access Road	Lake Valley	Eagle	26
Access Road	Spring Valley	Eagle	14
Electrical Substation Site - Secondary	Cave Valley	Silver King	1
Dry Lake Valley North Pressure Reducing Station	Dry Lake Valley	Silver King	7
Dry Lake Valley South Pressure Reducing Station	Dry Lake Valley	Silver King	7
Pumping Station Site	Lake Valley	Silver King	10
Regulating Tank Site	Dry Lake Valley	Silver King	5
Regulating Tank Site	Lake Valley	Silver King	5
Regulating Tank Site	Spring Valley	Eagle	5

3.13.1.3 Groundwater Development Areas

Groundwater development areas represent the area within the HMAs that would be utilized for pumping facilities (e.g., well pads, collector pipelines, electrical distribution lines). Eagle and Silver King HMAs would be affected by groundwater development. The exact location of well development facilities is undefined at this project stage, although well numbers and surface disturbance have been estimated. For the Proposed Action, the well locations would be optimized based on groundwater modeling and test results. Additional NEPA analysis (NEPA subsequent tiers) will be required to address specific well locations and collector pipelines.

The Silver King HMA contains approximately 8,000 acres of ET areas of cover types that make up ET areas, wetland/meadow and basin shrubland vegetation. Wetland/meadow vegetation consists of perennial grasses, sedges, and rushes that are typically spring-fed or sub-irrigated meadows. They tend to "green up" early in the spring and be highly palatable and productive sources of forage for wild horses. Basin shrubland vegetation consists of a variety of plant community types, but is dominated by greasewood, low saltbrush, big sagebrush, and other shrub species. In general, shrub species are high in protein and provide good forage throughout the winter when other sources of forage are dormant. For more information on wetland/meadow and basin shrubland vegetation types, see Section 3.5, Vegetation Resources. The Eagle HMA does not contain any ET areas.

Table 3.13-3 identifies the number and type of natural water sources within the HMAs overlapping the ROWs or groundwater development areas for the Proposed Action and alternatives.

Table 3.13-3 Natural Water Sources within Herd Management Areas in Groundwater Development Areas for the Proposed Action and Alternatives

HMA Name	Perennial Stream Mileage within HMA	Number of Springs within HMA
Nevada		
Eagle	20	208
Silver King	4	84

3.13.1.4 Region of Study

Table 3.13-4 identifies the HMAs that intersect the water resources region of study and the AMLs for each HMA (BLM 2007). In Nevada, only Muddy Mountains and Silver King HMAs are totally within the water resources region of study. In Utah, only the Choke Cherry HMA is completely within the water resources region of study.

Table 3.13-4 Herd Management Areas Within or Overlapping the Water Resources Region of Study

HMA Name	AML (herd size)	HMA Total Area[1]	HMA Area within the Region of Study[1]	HMA Area within the Region of Study - Percentage of Total HMA Area
Nevada				
Antelope	150	393,070	247,506	63
Antelope Valley	259	496,360	167,389	34
Eagle	100-210	668,407	632,071	95
Maverick-Medicine	276	318,575	61,536	19
Muddy Mountains	0	78,582	78,582	100
Silver King	60-128	605,631	605,631	100
Triple B	250-518	1,225,000	910,217	74
Utah				
Bible Spring	60	53,506	2,206	4
Choke Cherry	30	47,539	47,539	100
Confusion	115	293,862	151,107	51
Conger	80	171,094	108,089	63
Kingtop	40	171,648	65,714	38
Mount Elinor	25	37,370	473	1
Sulphur	250	265,257	180,327	68
Tilly Creek	50	32,974	6,061	18

[1]BLM acres .

3.13.2 Environmental Consequences

3.13.2.1 Rights-of-way

Issues

- Reduction of HMA carrying capacity resulting from surface disturbance.
- Construction effects on foaling season.
- Effects on wild horse movement from moving and staging of pipeline equipment, including possible entanglement in temporary fencing.
- Loss of, or injury to, wild horses due to open trenches.
- Effects of construction noise on wild horses.
- Construction impacts to water sources.

Assumptions

The following assumptions were used to support the impact analysis for wild horse management:

- Current HMA AMLs are correct and reflect the desired population for the present and foreseeable future of the affected HMAs. These numbers will remain relatively unchanged (BLM 2008).
- Wild horse actual use of forage will be estimated by multiplying inventoried or estimated numbers of horses by the length of grazing period on their summer and winter ranges. Other sources may be used to determine the effect of wild horses on HMA resources (BLM 2008).
- Vegetation community disturbance calculations were based on the proposed construction and operational configurations (footprints) presented for each pipeline, power facility, and ancillary facility ROW in Chapter 2, Proposed Action and Alternatives A to F.
- Short-term impacts are defined as less than 2 years. Long-term impacts are defined as greater than 2 years.
- Construction disturbances, while temporary in nature, have been defined as "long-term" for all vegetation cover types due to low precipitation rates, soil chemistry constraints, and low levels of soil moisture over most the year for most vegetation communities.
- In situations where the Las Vegas RMP does not specify management actions related to horse management, the actions described in the Ely RMP would be used.
- The ROW and groundwater development areas do not affect any wild horse HMAs in the southern part of the study area managed by the Southern Nevada BLM District.

Methodology for Analysis

Impact parameters were used as an indicator of impacts, as a means of quantifying impacts, and as a basis of comparison between alternatives or groups of alternatives. The Ely Final RMP established the AML for each HMA in the Ely District. The AML were established by taking into account the overall acreage, amount of browse, number and accessibility of water sources, and reproductive capacity of the herd (BLM 2008).

Impact parameters for wild horse management areas include the following:

- Acreage of HMAs potentially disturbed within the pipeline and power line ROW areas;
- Estimate of short- and long-term reduction of forage within HMAs based on short- and long-term displacement and drawdown effects (see **Appendix F3**, **Table F3.13-1**); and
- Potential habitat fragmentation that could affect normal wild horse movement patterns.
- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for

comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect wild horse habitat from ROW construction and operation activities. ROW construction activities would result in surface disturbances that would require vegetation restoration and subsequent monitoring and evaluation of success. Wild horse HMAs would be monitored for noxious weeds and successful establishment of desired grass, forb, and shrub species. The COM Plan would be used to monitor all of the impacts discussed in Section 3.13.2.

3.13.2.2 Proposed Action and Alternatives A through C

Right-of-way Construction

Reduction of Carrying Capacity in Herd Management Areas

Pipeline, power line, and ancillary facility construction would create surface disturbance only in Eagle and Silver King HMAs. The resulting loss of forage would total 693 acres (less than 1 percent of the available total forage in the HMA) and 2,322 acres (less than 2 percent of the available total), respectively (**Table 3.13-5** details the project footprint). The surface reclamation process is considered long term, as it is estimated to take up to 4 years to establish new vegetation (Hoover 2009). The COM Plan would be developed and implemented to monitor the success of vegetation reclamation for all project-related surface disturbing activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section. There is a risk that halogeton or other undesirable plant species could invade the ROW and reduce the amount of quality forage; however, this risk would be offset by ACMs (ACM A.1.82 through A.1.89), which address the control of noxious weeds.

Table 3.13-5 Facility Footprints within Eagle and Silver King Herd Management Areas, Proposed Action, and Alternatives A through C (acres)

Eagle HMA		
Pipeline Permanent ROW	Lake Valley	100
	Spring Valley	125
	Total	**225**
Pipeline Staging Area	Lake Valley	6
	Spring Valley	12
	Total	**18**
Pipeline Temporary ROW	Lake Valley	101
	Spring Valley	122
	Total	**223**
Power Line ROW	Lake Valley	100
	Spring Valley	122
	Total	**222**
Regulating Tank Site	Spring Valley	5
	Total	**5**
Eagle HMA Total		**693**

Table 3.13-5 Facility Footprints within Eagle and Silver King Herd Management Areas, Proposed Action, and Alternatives A through C (acres) (Continued)

Silver King HMA		
Pipeline Permanent ROW	Cave Valley	191
	Dry Lake Valley	487
	Lake Valley	58
	Total	**736**
Pipeline Staging Area	Cave Valley	15
	Dry Lake Valley	39
	Lake Valley	6
	Total	**60**
Pipeline Temporary ROW	Cave Valley	191
	Dry Lake Valley	482
	Lake Valley	55
	Total	**728**
Power Line ROW	Cave Valley	191
	Dry Lake Valley	486
	Lake Valley	58
	Total	**735**
Burrow Pit	Cave Valley	14
	Lake Valley	14
	Total	**28**
Pressure Reducing Station	Dry Lake Valley	**14**
Pumping Station Site	Lake Valley	**10**
Regulating Tank Site	Dry Lake Valley	5
	Lake Valley	5
	Total	**10**
Secondary Electrical Substation Site	Cave Valley	**1**
Silver King HMA Total		**2,322**
Eagle and Silver King HMA Total		**3,015**

Power line construction would require an approximately 50-foot by 50-foot clearing for each pole and a temporary access road for installation access. Per ACM A.1.20, crushing of vegetation would be preferred over blading for clearing ground for access roads. Installing facilities and clearing ROWs for roads could remove trees and shrubs that are important for browse or shelter. Mitigation measure ROW-WH-1 would preclude the removal of shrubs and trees except in situations where conflicts with pole positioning or ROW access cannot be resolved in another manner.

Conclusion. Surface disturbance in Eagle and Silver King HMAs in Cave, Dry Lake, Lake, and Spring valleys would impact less than 3 percent of the total acreage of the HMAs. The disturbance would be long term while vegetation is re-established; however, the carrying capacity of the HMA would not be affected.

Proposed mitigation measures:

ROW-WH-1: Shrub/tree Removal. In the Eagle and Silver King HMAs, where feasible, shrubs and trees within the power line ROW would be avoided during selection of power pole position and spur access road routes. Effectiveness: Reducing the loss of shrubs and trees would be effective in maintaining forage and cover for wild horses and avoiding long term vegetation recovery periods. Effects on other resources: This measure would be beneficial to wildlife (e.g., big game, migratory birds, small mammals) by maintaining existing forage and cover.

Residual impacts include:

- Exposed ground and a reduction in the overall grazing area would occur until vegetation is re-established. The surface disturbance impacts to the HMAs would be less than 1 percent of the total HMA areas.

Impacts Affecting Foaling Season

Foaling season typically occurs between the months of April and July. The BLM Ely District typically does not allow construction activities within HMAs during foaling season (April to July) (Hansen 2009). Pre-construction consultation with the BLM is recommended to identify avoidance areas for construction activities between April and July.

Construction activities in a given spread represent a minor portion of a HMA (the portion of both the Eagle and Silver King HMAs occupied by the ROW is less than 1 percent) and typically would occupy a given area for approximately 6 to 12 months (SNWA 2011). The majority of the activity would be associated with preparation for excavating the pipeline trench (e.g., staking, creating construction access, clearing the ROW).

Conclusion. As a substantial portion of the HMAs are not disturbed by construction and wild horses tend to avoid areas with unusual activity, interaction between wild horses and the construction site is unlikely and short term. With appropriate pre-consultation with the BLM to avoid construction activities in HMAs during foaling season, impacts to foaling mares or foals themselves are unlikely.

Proposed mitigation measures:

ROW-WH-2: Pre-construction Consultation. Pre-construction consultation with the BLM would occur to identify construction avoidance areas in HMAs between April and July. Effectiveness: Consultation would be effective in avoiding conflicts with wild horse foaling and other sensitive use areas. Effects on other resources: This measure would not affect other resources.

Residual impacts include:

None.

Fences and Other Restrictions to Movement Patterns

Staking, clearing, and grubbing of the pipeline ROW to remove large stumps and rocks would occur prior to installation of temporary construction access roads. A typical construction spread represents a minor portion of the HMAs crossed. According to the SNWA's POD construction schedule, a typical spread would occupy an area for 6 to 12 months, creating a short-term impact.

As stated in Chapter 2, there would be no permanent fencing or other access restrictions on the pipeline ROW. Temporary security and environmental exclusion fencing may be used on pipeline segments during construction; however, wild horses could navigate around these areas. Permanent security fencing surrounding aboveground facilities would consist of 6- to 8-foot-high chain link (or comparable material) and would be installed around permanent facilities where needed. For consistency with the BMPs set forth in the Ely ROD and approved RMP (BLM 2008), 12-inch by 1-inch flagging would be secured to new security fences every 16 feet to increase visibility and reduce the potential for horse injury (BLM 2008).

Temporary fencing may be placed in certain livestock high-use areas (such as the vicinity of water sources) for a period of two growing years to promote revegetation success (ROW-GRA-1). This same measure would apply to wild horse areas, as well as areas where seasonal livestock and wild horse use overlap.

Conclusion. During the 6- to 12-month period of construction, typical movement patterns of horses could be affected; however, this represents a small portion of either HMA and the impact would be short term. Permanent fencing would be restricted to permanent facilities and would be associated with a very small (<1 percent) area in Eagle and Silver King HMAs in Cave, Dry Lake, Lake, and Spring valleys. The impact of facility fencing would be long term. Temporary fencing would constitute a short-term impact as temporary fencing would be removed when the current trench spread is backfilled or vegetation reclamation standards have been met.

Proposed mitigation measures:

None.

Residual impacts include:

There would be a 6- to 12-month period when a minor portion of a HMA would be disturbed by activities within construction segments. This could temporarily adversely affect typical movement patterns of wild horses. Permanent facilities would be surrounded by permanent fencing; however, they would not restrict wild horse movement patterns. Despite fences being flagged, the potential for injury to wild horses does exist. Wild horses may be excluded by temporary fencing around certain livestock high use areas to promote revegetation for a short-term period (ROW-GRA-1).

Loss or Injuries from Open Trenches

Open trenches during pipeline construction could result in low level impacts on wild horses involving injury or mortalities. Per ACM A.1.12, staging areas, nursery sites, and facility sites would be enclosed with temporary security fences to reduce the potential for loss or injury. Security fencing typically would be used in those areas identified as having high potential to interfere with wild horse or seasonal big game movement. These new fences would be constructed to BLM standards and marked with 12-inch x 1-inch flagging every 16 feet (BLM 2008). The fence would be removed once the trench has been back-filled and construction activities are complete in that area.

ACM A.1.17 states that a 4-foot high orange snow fencing (or similar) would be used to enclose construction areas in areas where security fences are not utilized. Any excavation deeper than 1 foot not enclosed with security fencing would have escape ramps placed on either end and every quarter mile to prevent wild horses or other animals from becoming trapped in an open trench (ACM A.1.42).

Conclusion. The risk for loss or injury of wild horses is short-term in nature and is adequately addressed by applicant committed measures.

Proposed mitigation measures:

None.

Residual impacts include:

None.

Effects of Noise

Noise effects would extend beyond the physical boundary of the construction site and likely would create a larger disturbance area. It is difficult to quantify the spatial extent involved with noise disturbances. In an effort to minimize noise disturbance, the applicant has committed to ACMs A.9.1 and A.9.2, including noise control devices on equipment. In addition, frequent inspection of equipment to ensure noise control devices are functioning properly will occur and conservative operation of equipment and machinery to minimize noise levels (ACMs A.9.1 and A.9.3) will be enforced.

Conclusion. Noise effects associated with construction activities would be short term.

Proposed mitigation measures:

None.

Residual impacts include:

- There would be an area around the construction activities where noise would cause wild horses to avoid the area.

Impacts to Water Source Access

Disturbance to wild horse movement and access to existing water sources could occur from construction activities; however, pre-construction consultation with the BLM would ensure that existing water sources would continue to be available or supplemental water sources would be supplied. If construction occurs within two miles of an existing water source, temporary supplemental stock water tanks would be placed in suitable locations away from the construction sites (ACM A.5.72) to draw the horses away from the construction activities. The selection of suitable locations would be determined through consultation with the BLM.

During construction, locations that would require supplemental water supplies have been identified. While construction is taking place in Lake and southern Spring valleys, two temporary water hauls would be established. One aluminum water trough in southeast Spring Valley and one in the foothills on the western side of Fortification Range would be provided and maintained. This would provide additional water sources for wild horses whose migration pattern may pass through the construction area in Eagle HMA. Similarly, a water trough would be provided and maintained in the Muleshoe Use Area as a supplemental source for wild horses in the Silver King HMA (ACM A.5.73). Temporary fences would be constructed to continue to allow horse movement.

Conclusion. ACMs and consultation with the BLM would ensure that horses have adequate water supplies and would encourage horses to move away from active construction sites.

Proposed mitigation measures:

ROW-WH-3: Existing Water Supplies. Pre-construction consultation with the BLM would occur to ensure that wild horses have access to existing water supplies or that temporary supplemental water is supplied until access to existing water supplies is restored. Effectiveness: Maintaining access to existing water supplies would be effective in avoiding stress to animals that must seek alternative water sources. Effects to other resources: This measure would be beneficial to wildlife that use the same water sources as wild horses.

Residual impacts include:

None.

Facility Maintenance

Maintenance activities for operational facilities are unlikely to have additional impacts to HMA carrying capacities, as they would be conducted in areas already identified as being altered due to permanent disturbance. If maintenance or repair activities require additional ROWs, prior approval would be obtained from the BLM. A long-term reduction in forage could occur because of permanent aboveground facilities, including access roads in both Eagle and Silver King HMAs. The total disturbance of 164 acres (42 in Eagle and 122 in Silver King) is less than 1 percent of the total acreage of the ROW areas for both HMAs combined.

In addition to the impacts identified for construction of ROWs, the following impacts potentially could occur.

Animal-Vehicle Collisions

A construction access road would be maintained on the pipeline ROW for facility maintenance access. In an effort to avoid animal-vehicle collisions and similar effects related to the operation of the pipeline, ACM A.2.1 would require

that a maximum speed of 25 mph be maintained to allow adequate reaction time to avoid collisions with wild horses on or near roadways. In addition, signage to notify workers of the potential for wild horses in the area would be installed per direction from the Ely District ROD/Final EIS (BLM 2008).

Conclusion. Signage to warn travelers that wild horses could be in the area and maintaining a speed of 25 mph or less per ACM A.2.1 would adequately protect wild horses from animal-vehicle collisions.

Proposed mitigation measures:

None.

Residual impacts include:

- The potential for animal-vehicle collisions in the long term; corresponding to the relative length of the pipeline and duration of pipeline operation.

3.13.2.3 Alternative D

The ROWs for the main and lateral pipelines, power lines, access roads, and aboveground facilities would be located only in Clark and Lincoln counties. The footprint would consist of 225 miles of pipeline and 208 miles of power lines in those counties.

Right-of-way Construction

Reduction of Carrying Capacity in Herd Management Areas

Pipeline and power line construction would create surface disturbance in Eagle and Silver King HMAs. The resulting loss of forage would total 693 acres (less than 1 percent of the available total forage in the HMA) and 2,322 acres (less than 1 percent of the available total), respectively. The surface reclamation process is considered long term, as it is estimated to take up to 4 years to establish new vegetation (Hoover 2009). The COM Plan would be developed and implemented to monitor the success of vegetation reclamation for all project-related surface disturbing activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section. There is a risk that halogeton or other nuisance plant species could invade the ROW and reduce the amount of quality forage; however, this risk would be offset by ACMs A.1.82 through A.1.89, which address the control of noxious weeds.

Power line construction would require an approximately 50-foot by 50-foot clearing for each pole and a temporary access road for installation access. Per ACM A.1.20, crushing of vegetation would be preferred over blading for clearing ground for access roads. Installing facilities and clearing ROWs for roads could impact trees and shrubs that are important for browse or shelter. Mitigation measure ROW-WH-1 would preclude the removal of shrubs and trees except in situations where conflicts with pole positioning or ROW access cannot be resolved in another manner.

Construction. Surface disturbance in Eagle and Silver King HMAs in Cave, Dry Lake, Lake, and Spring valleys would impact less than 1 percent of the total acreage of the HMAs. The disturbance would be long term while vegetation is re-established; however, the carrying capacity of the HMA would not be affected.

Proposed mitigation measures:

ROW-WH-1: Shrub/tree Removal. In the Eagle and Silver King HMAs, where feasible, shrubs and trees within the power line ROW would be avoided during selection of power pole position and spur access road routes. Effectiveness: The effectiveness should be the same as for the Proposed Action.

Residual impacts include:

- Exposed ground and a reduction in the overall grazing area would occur until vegetation is re-established. The surface disturbance impacts to the HMAs would be less than 1 percent of the total HMA areas.

Impacts Affecting Foaling Season

The potential impacts affecting foaling season and the recommended mitigation implemented to reduce impacts would be the same as discussed for the Proposed Action.

Conclusion. The majority of the HMAs are not disturbed by construction and wild horses tend to avoid areas with unusual activity; interaction between wild horses and the construction site is unlikely and short term. With appropriate pre-consultation with the BLM to avoid construction activities in HMAs during foaling season, impacts to foaling mares or foals themselves are unlikely.

Proposed mitigation measures:

ROW-WH-2: Pre-construction Consultation. Pre-construction consultation with the BLM would occur to identify construction avoidance areas in HMAs between April and July. Effectiveness: The effectiveness would be the same as for the Proposed Action.

Residual impacts include:

None.

Fences and Other Restrictions to Movement Patterns

The potential effects of fences and other restrictions to movement patterns and the ACMs implemented to reduce impacts would be the same as discussed for the Proposed Action.

Conclusion. During the 6- to 12-month period of construction, typical movement patterns of wild horses could be affected; however, this represents a small portion of either HMA. Permanent fencing would be restricted to permanent facilities and would be associated with a very small (<1 percent) area in Eagle and Silver King HMAs in Delamar, Dry Lake, Cave, Lake, and Spring valleys. The impact of facility fencing would be long term. Temporary fencing would be constructed to BLM standards to avoid disruption to wild horse movement, and would constitute a short-term impact as temporary fencing would be removed when the current trench spread is backfilled. Wild horses may be excluded by temporary fencing around certain livestock high-use areas to promote revegetation for a short-term period (ROW-GRA-1).

Proposed mitigation measures:

None.

Residual impacts include:

- There would be a 6- to 12-month period when a minor portion of a HMA would be disturbed by activities within construction segments. This could temporarily have an effect on typical movement patterns of wild horses. Permanent facilities would be surrounded by permanent fencing; however, they would not restrict wild horse movement patterns. Despite being flagged, the potential for injury to wild horses does exist.

Loss or Injuries from Open Trenches

The potential effects of open trenches and the ACMs implemented to reduce impacts would be the same as discussed for the Proposed Action.

Conclusion. The risk for loss or injury of wild horses is short-term in nature and is adequately addressed by applicant committed measures.

Proposed mitigation measures:

None.

Residual impacts include:

None.

Effects of Noise

The potential effects of noise and the ACMs implemented to reduce impacts would be the same as discussed for the Proposed Action.

Conclusion. Construction activities in a given area will be short term and noise effects associated with those activities also will be short term.

Proposed mitigation measures:

None.

Residual impacts include:

- There will be an area around the construction activities where noise will likely have a deterring effect on wild horses. The actual effects on the horses is difficult to quantify.

Impacts to Water Source Access

The potential impacts to water source access and the ACMs implemented to reduce impacts would be the same as discussed for the Proposed Action.

Conclusion. ACMs and consultation with the BLM will ensure that horses have adequate water supplies and are encouraged to move away from active construction sites.

Proposed mitigation measures:

ROW-WH-3: Existing Water Supplies. Pre-construction consultation with the BLM would occur to ensure that wild horses have access to existing water supplies or that temporary supplemental water is supplied until access to existing water supplies is restored. Effectiveness: The effectiveness would be the same as described for the Proposed Action. Effects on other resources: This measure would be beneficial to wildlife that use the same water sources as wild horses.

Residual impacts include:

None.

Facility Maintenance

Maintenance activities for operational facilities are unlikely to have additional impacts to HMA carrying capacities as they would be conducted in areas already identified as lost to permanent disturbance. If maintenance or repair activities require additional ROWs, prior approval would be obtained from the BLM. A long-term reduction in forage could occur because of permanent aboveground facilities, including access roads in both Eagle and Silver King HMAs. The total of 164 acres (42 in Eagle and 122 in Silver King) is less than 1 percent of the total acreage of the ROW areas for both HMAs combined.

In addition to the impacts identified for construction of ROWs, the following impacts potentially may occur.

Animal-Vehicle Collisions

A construction access road would be maintained on the pipeline ROW for facility maintenance access. In an effort to avoid animal-vehicle collisions and similar effects related to the operation of the pipeline, ACM A.2.1 would require that a maximum speed of 25 mph be maintained to allow adequate reaction time to avoid collisions with wild horses on or near roadways. In addition, signage to notify workers of the potential for wild horses in the area would be installed per direction from the Ely District ROD/Final EIS (BLM 2008).

Conclusion. Signage to warn travelers that wild horses could be in the area and maintaining a speed of 25 mph or less per ACM A.1.29 would adequately protect wild horses from animal-vehicle collisions.

Proposed mitigation measures:

None.

Residual impacts include:

- The potential for animal-vehicle collisions in the long term; corresponding to the relative length of the pipeline and duration of pipeline operation.

3.13.2.4 Alternatives E and F

The ROWs for the main and lateral pipelines, power lines, access roads, and aboveground facilities would be located in Clark, Lincoln, and White Pine counties; however, there would be no disturbance in Snake Valley. The footprint would consist of 263 miles of pipeline and 280 miles of power lines in Clark and Lincoln counties.

Right-of-way Construction

Reduction of Carrying Capacity on Herd Management Areas

Pipeline and power line construction would create surface disturbance in Eagle and Silver King HMAs. The resulting loss of forage would total 693 acres (less than 1 percent of the available total forage in the HMA), and 2,322 acres (less than 2 percent of the available total), respectively. The surface reclamation process is considered long term, as it is estimated to take up to 4 years to establish new vegetation (Hoover 2009). The COM Plan would be developed and implemented to monitor the success of vegetation reclamation for all project-related surface disturbing activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section. There is a risk that halogeton or other nuisance plant species could invade the ROW and reduce the amount of quality forage; however, this risk would be offset by ACMs A.1.82 through A.1.89, which addresses the control of noxious weeds.

Power line construction would require an approximately 50-foot by 50-foot clearing for each pole and a temporary access road for installation access. Per ACM A.1.20, crushing of vegetation would be preferred over blading for clearing ground for access roads. Installing facilities and clearing ROWs for roads could impact trees and shrubs that are important for browse or shelter. Mitigation measure ROW-WH-1 would preclude the removal of shrubs and trees except in situations where conflicts with pole positioning or ROW access cannot be resolved in another manner.

Conclusion. Surface disturbance in Eagle and Silver King HMAs in Delamar, Dry Lake, Cave, Lake, and Spring valleys would impact less than 1 percent of the total acreage of the HMAs. The disturbance would be long term while vegetation is re-established; however, the carrying capacity of the HMA would not be affected.

Proposed mitigation measures:

ROW-WH-1: Shrub/tree Removal. In the Eagle and Silver King HMAs, where feasible, shrubs and trees within the power line ROW would be avoided during selection of power pole position and spur access road routes. Effectiveness: The effectiveness would be the same as for the Proposed Action.

Residual impacts include:

- Exposed ground and a reduction in the overall grazing area would occur until vegetation is re-established. The surface disturbance impacts to the HMAs would be less than 1 percent of the total HMA areas.

Impacts Affecting Foaling Season

The impacts affecting foaling season and ACMs implemented to reduce impacts would be the same as discussed for the Proposed Action.

Conclusion. The majority of the HMAs are not disturbed by construction and wild horses tend to avoid areas with unusual activity; interaction between wild horses and the construction site is unlikely and short term. With appropriate pre-consultation with the BLM to avoid construction activities in HMAs during foaling season, impacts to foaling mares or foals themselves are unlikely.

Proposed mitigation measures:

ROW-WH-2: Pre-construction Consultation. Pre-construction consultation with the BLM would occur to identify construction avoidance areas in HMAs between April and July. Effectiveness: The effectiveness should be the same as for the Proposed Action.

Residual impacts include:

None.

Fences and Other Restrictions to Movement Patterns

The effects of fencing on movement patterns and ACMs implemented to reduce impacts would be the same as discussed for the Proposed Action.

Conclusion. During the 6- to 12-month period of construction, typical movement patterns of wild horses could be affected; however, this represents a small portion of either HMA. Permanent fencing would be restricted to permanent facilities and would be associated with a very small (<1 percent) area in Eagle and Silver King HMAs in Delamar, Dry Lake, Cave, Lake, and Spring valleys. The impact of facility fencing would be long term. Temporary fencing would be constructed to BLM standards to avoid disruption to wild horse movement, and would constitute a short-term impact as temporary fencing would be removed when the current trench spread is backfilled. Wild horses may be excluded by temporary fencing around certain livestock high-use areas to promote revegetation for a short-term period (ROW-GRA-1).

Proposed mitigation measures:

None.

Residual impacts include:

- There would be a 6- to 12-month period when a minor portion of a HMA would be disturbed by activities within construction segments. This could temporarily change typical movement patterns of wild horses or short distances. Permanent facilities would be surrounded by permanent fencing; however, they would not restrict wild horse movement patterns. Despite fences being flagged, the potential for injury to wild horses does exist.

Loss or Injuries from Open Trenches

The effects of open trenches on wild horses and ACMs implemented to reduce impacts would be the same as discussed for the Proposed Action.

Conclusion. The risk for loss or injury of wild horses is short-term in nature and is adequately addressed by applicant committed measures.

Proposed mitigation measures:

None.

Residual impacts include:

None.

Effects of Noise

The effects of noise on wild horses and ACMs implemented to reduce impacts would be the same as discussed for the Proposed Action.

Conclusion. Construction activities in a given area will be short term and noise effects associated with those activities also will be short term.

Proposed mitigation measures:

None.

Residual impacts include:

- There would be an area around the construction activities that wild horses would avoid during the construction period.

Impacts to Water Source Access

The impacts to water source access and ACMs implemented to reduce impacts would be the same as discussed for the Proposed Action.

Conclusion. ACMs and consultation with the BLM will ensure that horses have adequate water supplies and are encouraged to move away from active construction sites.

Proposed mitigation measures:

ROW-WH-3: Existing Water Supplies. Pre-construction consultation with the BLM would occur to ensure that wild horses have access to existing water supplies or that temporary supplemental water is supplied until access to existing water supplies is restored. Effectiveness: The effectiveness would be the same as described for the Proposed Action. Effects on other resources: This measure would be beneficial to wildlife that use the same water sources as wild horses.

Residual impacts include:

None.

Facility Maintenance

Maintenance activities for operational facilities are unlikely to have additional impacts to HMA carrying capacities as they would be conducted in areas already identified as lost to permanent disturbance. If maintenance or repair activities require additional ROWs, prior approval would be obtained from the BLM. A long-term reduction in forage could occur because of permanent aboveground facilities, including access roads in both Eagle and Silver King HMAs. This total of 164 acres (42 in Eagle and 122 in Silver King) is less than 1 percent of the total acreage of the ROW areas for both HMAs combined.

Animal-Vehicle Collisions

A construction access road would be maintained on the pipeline ROW for facility maintenance access. In an effort to avoid animal-vehicle collisions and similar effects related to the operation of the pipeline, ACM A.2.1 would require that a maximum speed of 25 mph be maintained to allow adequate reaction time to avoid collisions with wild horses on or near roadways. In addition, signage to notify workers of the potential for wild horses in the area would be installed per direction from the Ely District ROD/Final EIS (BLM 2008).

Conclusion. Signage to warn travelers that wild horses could be in the area and maintaining a speed of 25 mph or less per ACM A.1.29 would adequately protect wild horses from animal-vehicle collisions.

Proposed mitigation measures:

None.

Residual impacts include:

- The potential for animal-vehicle collisions in the long term; corresponding to the relative length of the pipeline and duration of pipeline operation.

3.13.2.5 Alignment Options 1 through 4

Impacts for Alignment Options 1 through 4 are identified in relation to the relevant segment of the Proposed Action (**Table 3.13-6**).

Table 3.13-6 Wild Horse Impact Summary for Alignment Options 1 through 4

Option	Comparison to Relevant Proposed Action Segment
Alignment Option 1 (Humboldt-Toiybe Power Line Alignment) **Option Description**: Change the locations of a portion of the 230-kV power line from Gonder Substation near Ely to Spring Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	This option and the equivalent segment of the Proposed Action would not cross an HMA, and there would be no difference in effects to wild horses.
Alignment Option 2 (North Lake Valley Pipeline Alignment) **Option Description**: Change the locations of portions of the mainline pipeline and electrical transmission line in North Lake Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	This option would reduce the surface disturbance in the Eagle HMA by 537 acres, but increase the surface disturbance within the Silver King HMA by 44 acres as compared to the equivalent Proposed Action segments. The net effect would be that implementation of the option would reduce the overall long term forage loss for wild horses by approximately 493 acres.
Alignment Option 3 (Muleshoe Substation and Power Line Alignment) **Option Description**: Eliminate the Gonder to Spring Valley transmission line, and construct a substation with an interconnection with an interstate, high voltage power line in Muleshole Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	This option would increase the permanent commitment of wild horse forage area by 44 acres as the result of constructing the Muleshoe Substation and power line, as compared to the Proposcd Action facilities that do not include a new Muleshoe Substation.
Alignment Option 4 (North Delamar Vallcy Pipeline and Power Line Alignment) **Option Description**: Change the location of a short section of mainline pipeline in Delamar Valley to follow an existing transmission line. **Applicable To**: All alternatives.	This option and the equivalent segment of the Proposed Action would not cross an HMA, and there would be no difference in effects to wild horses.

3.13.2.6 No Action

Under the No Action Alternative, the project would not be constructed or operated as proposed and no proposed project-related surface disturbance would occur. Impacts to HMAs would continue at present levels as result of natural conditions and existing and other proposed development within the project area. Wild horse management on public lands would continue based on the management direction in the Ely and Las Vegas RMPs.

3.13.2.7 Comparison of Alternatives

Table 3.13-7 provides a comparison of impacts for construction and facility maintenance of the Proposed Action and all alternatives on the affected HMAs. ROW construction and facility maintenance impacts to HMAs are the same for

all pumping alternatives as the two affected HMAs (Eagle and Silver King) occur in Lincoln County and all of the ROWs for the pumping alternatives follow the same route in Lincoln County.

Table 3.13-7 Comparison of Alternatives

Parameter	Proposed Action and Alternatives A through C	Alternative D	Alternatives E and F
Temporary Reduction in Acres in Eagle HMA	693	693	693
Temporary Reduction in Acres in Silver King HMA	2,322	2,322	2,322
Permanent Reduction in Acres in Eagle HMA	42	42	42
Permanent Reduction in Acres in Silver King HMA	122	122	122

3.13.2.8 Groundwater Development and Groundwater Pumping

Issues

Groundwater Field Development Construction and Facility Maintenance

- Permanent reduction of HMA carrying capacity from construction activities and permanent facilities.
- Potential for increased human presence.
- Potential for increased animal-vehicle collisions.
- Potential effects of noise from construction and facility operation.
- Potential disruption of normal herd movement from temporary or permanent fencing.

Groundwater Pumping

- Potential effects on forage production from construction disturbance and groundwater drawdown.
- Effects of groundwater pumping on water sources (availability) for wild horses.

Assumptions

Groundwater Field Development Construction and Facility Maintenance

- Vegetation community disturbance calculations were based on the proposed construction and operational configurations (footprints) presented for each pipeline, power facility, and ancillary facility ROW in Chapter 2, Proposed Action and Alternatives A to F.
- Short-term impacts are defined as less than 2 years. Long-term impacts are defined as greater than 2 years.
- Vegetation reclamation could take 4 or more years (Hoover 2009).
- Construction disturbances, while temporary in nature, have been defined as "long-term" for all vegetation cover types due to low precipitation rates, soil chemistry constraints, and low levels of soil moisture over most the year for most vegetation communities.
- Vegetation that is dependent on groundwater could transition to other states or types over time; however, the density and overall composition is not anticipated to substantially change (see Section 3.5, Vegetation Resources).

Groundwater Pumping

- Groundwater pumping potentially could impact groundwater-fed water sources in the high- to medium-risk areas closely associated with perennial streams and springs, see Section 3.3, Water Resources. Phreatophytic vegetation within wild horse HMAs could experience gradual changes including loss of vigor, changes in plant community composition, or even total loss in areas of groundwater drawdown greater than 50 feet (see Section 3.5, Vegetation Resources).
- Riparian and medium density vegetation within HMA areas have a high potential to be affected if they are located within the 10-foot drawdown contour, as determined by groundwater modeling (SNWA 2011).
- Grasses, forbs, and shrubs not connected to the groundwater table would not incur major reductions in amount or quality from groundwater drawdown, although vegetation composition may change over time.
- Assumptions about the potential changes in wild horse water sources and forage (vegetation composition and structure) from groundwater pumping do not incorporate additional assumptions about the effects of climate change because specific long-term effects of climate change are not presently known, and the magnitude of these effects will likely vary regionally. A general discussion of climate change effects is provided in Section 3.13.3.1, Cumulative Impacts Common to All Alternatives.

Methodology for Analysis

Impact parameters for groundwater development areas are similar to those used for ROW construction. The water resources region of study is used for analysis of groundwater drawdown impacts as water is the limiting factor for herd

health. BLM RMP management actions and best management practices plus current ACMs were evaluated to limit the extent and duration of predicted impacts. Additional mitigation measures were recommended to reduce or offset impacts, mitigation measure effectiveness was estimated, and a residual impact summary was developed for each impact issue.

Groundwater Field Development Construction and Facility Maintenance

- Estimates of the short- and long-term reduction of forage within HMAs will be based on acreage calculations of surface impacts.
- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect wild horse habitat from groundwater development activities.
- Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

Groundwater Pumping

- Estimates of effects to areas containing wetland vegetation and phreatophytes were determined based on the areas that occur where the 10 foot or greater drawdown contour overlaps with areas where depth to groundwater is less than 50 feet, respectively, as predicted by the groundwater model. For more detailed information on the model analysis see Section 3.5, Vegetation Resources.
- Estimates of the effects to water supplies (streams and springs) within HMAs were based on their location within the areas of low, medium, or high risk (as predicted by the area geology and groundwater model predictions of drawdown of 10-foot or greater), see Section 3.3, Water Resources.
- The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect wild horse habitat from groundwater pumping activities.

3.13.2.9 Proposed Action

Groundwater Development Area

An accurate location of well development facilities is undefined at this project stage. For the Proposed Action, the well locations would be optimized based on groundwater modeling and test results. Additional NEPA analysis (NEPA subsequent tiers) will be required to address specific well locations and collector pipelines. Proposed groundwater development areas located within Eagle and Silver King HMAs would overlap three hydrologic basins: Spring, Cave, and Dry Lake. Impacts resulting from the construction of wells, access roads, collector lines, and supporting ancillary facilities in the three valleys would be similar to the impacts discussed for the pipeline and power line ROWs. The COM Plan would be developed and implemented to protect wild horse habitat from groundwater development activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Reduction of Carrying Capacity in Herd Management Areas

Construction of well pads, collector pipelines, access roads, and power lines would result in surface disturbance. Forage quality and quantity, shelter, and natural water sources would likely be compromised by temporary construction activities and permanent facilities and maintenance activities. Although no development plans are available, it could be assumed that beneficial vegetation would be impacted in proportion to the relative surface area within the groundwater development areas.

Animal-Vehicle Collisions

Construction and operation/maintenance would require access roads which generally would be contained within the ROWs. In an effort to avoid animal-vehicle collisions and similar effects related to the operation of the pipeline, ACM A.2.1 would require that a maximum speed of 25 mph be maintained to allow adequate reaction time to avoid collisions with wild horses or other wildlife on or near roadways. In addition, signage to notify workers of the potential for wild horses in the area would be installed per direction from the Ely District ROD/Final EIS (BLM 2008).

Effects of Noise

Noise effects would extend beyond the physical boundary of the construction site and likely would create a larger area that would be avoided by wild horses during construction. In an effort to minimize noise disturbance, the applicant has committed to ACM A.9.1 and ACM A.9.2, including noise control devices on equipment. Pump station noise would be limited to 70 A-weighted decibels at 500 feet from the source. In addition, frequent inspection of equipment to ensure noise control devices are functioning properly will occur and conservative operation of equipment and machinery to minimize noise levels (ACMs A.9.1 and A.9.3) will be enforced.

Impacts to Water Source Access

Disturbance to wild horse movement and access to existing water sources could occur from construction activities; however, pre-construction consultation with the BLM would ensure that existing water sources would continue to be available or supplemental water sources would be supplied. If construction occurs within two miles of an existing water source, temporary supplemental stock water tanks would be placed in suitable locations away from the construction sites (ACM A.5.72) to draw the horses away from the construction activities. Measure ROW-WH-3 states that selection of suitable locations would be determined through consultation with the BLM.

Fencing

No fencing would be permanently located along pipeline ROWs. Temporary fencing could consist of highly visible 4-foot-high orange snow fence. Permanent security fencing would surround aboveground facilities. For consistency with the BMPs set forth in the Ely ROD and Approved RMP (BLM 2008), 12 inch by 1 inch flagging would be secured to new fences every 16 feet to increase visibility and reduce the potential for horse injury (BLM 2008). Wild horses may be excluded by temporary fencing around certain livestock high-use areas to promote revegetation for a period of two growing years or until the BLM determines that reclamation meets BLM BMP standards (see ROW-GRA-1).

Conclusion. Well locations have not been identified so specific impacts to vegetation communities cannot be accurately predicted. Long term or permanent vegetation loss would occur due to temporary ROWs and permanent facilities in the Eagle and Silver King HMAs (see **Table 3.13-5**). It is unlikely that lost grazing acreage would reduce the available forage to the extent where a decrease in the AML would be needed.

The construction impacts associated with increased human presence would be largely short term (less than 2 years) but would occur around the clock for several months. Operation and maintenance impacts will be long term although intermittent. Operation would be minimized through the use of off-site monitoring of the wells and associated facilities.

Signage to warn travelers that wild horses could be in the area and maintaining a speed of 25 mph or less per ACM A.2.1 will adequately protect wild horses from animal-vehicle collisions.

Construction activities in a given area will be short term and noise effects associated with those activities also will be short term. Noise effects will be minimized to the extent possible by ACMs A9.1 through A.9.3.

Permanent fencing would be restricted to enclosing permanent facilities and would be associated with a very small (<1 percent) area in Eagle and Silver King HMAs in Cave, Dry Lake, Lake, and Spring valleys. The impact of facility fencing would be long term. Temporary fencing would constitute a short-term impact as temporary fencing would be removed when the trench is backfilled.

Proposed mitigation measures:

The same mitigation measures (ROW-WH-1, ROW-WH-2, and ROW-WH-3) would be applied to the Proposed Action for groundwater development construction and facility maintenance. The effectiveness of these measures should be the same as for the ROW Proposed Action.

Potential residual impacts include:

- There is potential for animal-vehicle collisions during construction and in the future since facility maintenance will be performed as long as the pipeline is in operation. Wild horses may avoid construction and permanent facilities where noise is generated.

Groundwater Pumping

The capacity of the habitat within each HMA to sustain a wild horse population includes consideration of adequate forage, water, space, and cover. Water is a limiting factor for horse herds in some HMAs, affecting not only the basic survival of horses within these areas, but also the distribution of their use and degree of conflict with other animals, including livestock and wildlife (BLM 2007). As an index for change to perennial streams and springs, areas within the 10-foot drawdown contour, as predicted by the groundwater model, potentially could exhibit diminished or eliminated flow from natural water sources. The Antelope, Eagle, and Silver King HMAs are the only HMAs that contain springs and/or streams within the 10-foot drawdown contour (**Figures 3.13-1** and Section 3.3, Water Resources, **Figures 3.3.2-3** through **3.3.2-5**). Information related to groundwater development areas and groundwater pumping, including the methodology, and assumptions are available in Section 3.3, Water Resources. The COM Plan would be developed and implemented to protect wild horse habitat from groundwater pumping activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions, BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS.

Table 3.13-8 shows the number of springs, both field verified and unverified, and miles of perennial streams that occur within the area of moderate to high risk of drawdown, as predicted by the groundwater model and the geology in the area (unverified streams were defined from map data sources). These areas typically are associated with the valley margins and valley bottoms. The table shows the drawdown predictions of the Water Resource risk analysis at three time frames: full build out, full build out plus 75 years, and full build out plus 200 years.

Table 3.13-8 Number of Springs and Miles of Perennial Streams within Herd Management Areas Potentially Affected by Groundwater Drawdown for the Proposed Action

HMA	Springs (Verified/Unverified)[1]			Perennial Streams (Miles)		
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Antelope	0/0	0/0	0/8	0	0	0
Silver King	0/0	0/0	0/1	0	0	0
Eagle	0/0	1/1	1/4	0	0	<1
Total	**0/0**	**1/1**	**1/13**	**0**	**0**	**<1**

[1] Unverified springs originate from map data sources and may change over time. Verified streams have been inventoried through field surveys.

Reduction in flow or elimination of spring and stream flows within HMAs could decrease the available water and result in increased distance between adequate forage and water supplies. The overuse of remaining water sources could result in damage to areas around the sources. A reduced number of water sources could effectively reduce the acreage of the HMAs by limiting the horses to the range that is within a reasonable distance for daily travel by the herds. As a result, the BLM may need to reevaluate the AML in the HMA. Management action WH-7 of the BLM Ely District ROD and Approved RMP (BLM 2008) allows adjustments in AML based on monitoring data (including monitoring for available habitat), typically in conjunction with the watershed analysis process.

With the exception of wetland/meadow and basin shrubland areas, the majority of forage for wild horses is supported by rain, snow, and other water sources not connected to groundwater. As such, upland forage would not be affected by Proposed Action pumping (see Section 3.5, Vegetation Resources, for more information).

Table 3.13-9 shows the acreage of impacts to wetland/meadow and basin shrubland areas potentially affected by Proposed Action pumping. According to this analysis, impacts would occur in Lake Valley in the time frame of full build out plus 200 years. The Antelope and Eagle HMAs are the only HMAs that contain wetland/meadow and basin shrubland within the 10-foot drawdown contour (**Figures 3.13-1** and Section 3.5, Vegetation Resources, **Figure 3.5-6**).

Table 3.13-9 Acres of Wetland/Meadow and Basin Shrubland within Herd Management Areas Potentially Affected by Proposed Action

HMA/Valley	Full Build Out	Full Build Out Plus 75 years	Full Build Out Plus 200 years
Antelope Valley HMA			
Steptoe Valley	0	0	0
Eagle HMA			
Dry Valley	0	0	0
Eagle Valley	0	0	0
Lake Valley	0	0	2,511
Total	**0**	**0**	**2,511**

Proposed monitoring measure:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

Proposed mitigation measures:

As described in Water Resources, Section 3.3, water resources mitigation measure GW-WR-7 would assist in avoiding or minimizing impacts to federal resources and federal water rights. Implementation of this measure would reduce potential effects to hydric soils associated with locations where federal water rights or federal water dependent resources are mitigated. Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

GW–WH-1: Water Source Maintenance. In cooperation with the BLM, SNWA would identify key natural water sources and monitor those sources on a regular basis (frequency determined by the BLM). If impacts to those sources are observed, SNWA would consult with the BLM to identify locations where artificial water sources could be maintained to supply herds with adequate water supplies. This mitigation measure is not limited to impacts that are a result of the SNWA groundwater development activities.v Effectiveness: This would be effective for ensuring that

horses have adequate access to water supplies. Effects on other resources: Implementation of this measure could result in short-term surface disturbance, human presence, and minor vehicle traffic to establish artificial water supplies.

Monitoring for the above mentioned mitigation measure could be conducted in conjunction with the hydrologic and biological monitoring that is to be conducted under the COM Plan and comprehensive monitoring, mitigation, and management plan for Snake Valley (3M Plan) and Spring, Delamar, Dry Lake, and Cave valleys as summarized in mitigation measure GW-WR-3.

Potential residual impacts include:

The COM Plan, and water resources monitoring and mitigation measures could be effective in reducing impacts to wild horses and herd management areas. Two relevant objectives of the COM Plan to wild horses and herd management areas are designed to protect federal resources and water rights. Long-term potential for loss of surface water sources and forage vegetation production and quality may reduce the carrying capacity of affected herd management areas. It is not possible to determine the level of impact reduction at this time. Residual effects on livestock grazing operations could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to wild horses could occur at some locations.

3.13.2.10 Alternatives A through F

Groundwater Development

Due to the fact that exact well locations are undetermined, it is not possible to assess surface disturbance to HMAs resulting from groundwater development. Additional NEPA analysis will be required to address these impacts. The nature of these impacts would be similar to those discussed for the Proposed Action.

Groundwater Pumping

The impacts to HMAs that could result from groundwater pumping for Alternatives A through F are summarized in **Table 3.13-10**. The majority of the springs, streams, and ET area acres in the moderate and high risk areas are located within the Eagle HMA.

Table 3.13-10 Summary for Herd Management Areas Impacts, Proposed Mitigation, and Residual Effects for Groundwater Pumping, Alternatives A through F

Parameter	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	No Action
Unverified springs at risk within HMAs at full build out, full build out plus 75 years, and full build out plus 200 years[1]	0, 1, and 4	0, 1, and 7	0, 1, and 1	0, 6, and 25	0, 1, and 4	0, 1, and 10	11, 18, and 29
Verified springs at risk within HMAs at full build out, full build out plus 75 years, and full build out plus 200 years[1]	0, 1, and 1	0, 1, and 2	0, 1, and 1	0, 1, and 2	0, 1, and 1	0, 1, and 1	1,1, and 1
Perennial stream miles at risk within HMAs at full build out, full build out plus 75 years, and full build out plus 200 years	0, 0, and <1 miles	0, 0, and <1 miles	0 miles	0, <1 and 6 miles	0 miles	0 miles	0, 1, and 12 miles
ET area acres at risk within HMAs at full build out, full build out plus 75 years, and full build out plus 200 years[1]	0	0, 0, and 2,511	0	0, 0, and 2,511	0	0, 0, and 1,266	1,473, 2,511, and 2,511

Table 3.13-10 Summary for Herd Management Areas Impacts, Proposed Mitigation, and Residual Effects for Groundwater Pumping, Alternatives A through F (Continued)

COM Plan
• The COM Plan would be developed and implemented to protect wild horse habitat from groundwater development activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions, RMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS.
Recommended Monitoring
As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).
Recommended Mitigation
• As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7). • **GW–WH-1 (Water Source Maintenance)** would be implemented to monitor and maintain key water sources for wild horses.
Residual Impacts
• The COM Plan, and water resources monitoring and mitigation measures could be effective in reducing impacts to wild horses and herd management areas. Two relevant objectives of the COM Plan to wild horses and herd management areas are designed to protect federal resources and water rights. Long-term potential for loss of surface water sources and forage vegetation production and quality may reduce the carrying capacity of affected herd management areas. It is not possible to determine the level of impact reduction at this time. Residual effects on livestock grazing operations could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to wild horses could occur at some locations.

[1] Unverified springs originate from map data sources and may change over time. Verified streams have been inventoried through field surveys.

3.13.2.11 No Action Alternative

Groundwater Development Area

Under the No Action Alternative the project would not be constructed and there would be no maintenance. There would be no surface impacts to vegetation or wild horses and herd management areas. Current environmental conditions would continue to influence the landscape and current land management objectives and activities would provide guidance.

Groundwater Pumping

The type of impacts to springs, streams, and wetland/meadow and basin shrubland (ET unit) associated with groundwater drawdown, due to existing pumping activities, would be similar to the Proposed Action. **Tables F3.13-1** through **F3.13-4** present numbers for springs, streams, and ET unit areas contained within high or moderate risk areas for all alternatives. **Table 3.13-10** provides a summary of potential impacts to these resources for the No Action Alternative.

Conclusion. Model simulations predicted that current groundwater pumping would have drawdown effects of 10-foot or greater primarily in Lincoln County. Similar vegetation composition changes as discussed under the Proposed Action due to a reduction of available soil moisture would occur. At full build out plus 200 years, modeling predicted that 30 springs, 12 miles of perennial streams, and 2,511 acres of wetland/meadow and basin shrubland ET areas within the Antelope Valley, Eagle, and Silver King HMAs would be affected by a lack of plant available soil moisture.

3.13.3 Cumulative Impacts

3.13.3.1 Impacts Common to All Alternatives

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Wild Horse and Burro Herd Management Areas

Climate change effects on Wild Horse and Burro Management will largely be associated with those potential effects outlined in Sections 3.5, Vegetation Resources; 3.6, Terrestrial Wildlife; and 3.12, Rangelands and Grazing.

Climate change could specifically affect Wild Horse and Burro Management by impacting:

- Vector and pathogen distribution;
- Thermal extremes;
- Modifying, shifting, or eliminating habitats;
- Forage – quality in pasture and rangeland generally declines with increasing CO_2 concentration because of the effects on plant nitrogen and protein content, reducing the land's ability to supply adequate feed; and
- Available Water Sources: reductions/changes in precipitation.

3.13.3.2 Issues

Rights-of-way and Groundwater Development Area Construction and Facility Maintenance

- Reduction of HMA carrying capacity resulting from surface disturbance.
- Construction effects to foaling season.
- Effects to wild horse movement from moving and staging of pipeline equipment, including possible entanglement in temporary fencing.
- Loss of, or injury to, wild horses due to open trenches.
- Effects of construction noise on wild horses.
- Construction impacts to water sources

Groundwater Pumping

- Potential effects on forage production from construction disturbance and groundwater drawdown.
- Effects of groundwater pumping on water sources (availability) for wild horses.

3.13.3.3 Assumptions

Rights-of-way and Groundwater Development Area Construction and Facility Maintenance

- The study area is the proposed ROW surface disturbance area for pipelines, power lines, aboveground facilities, and access roads for each project alternative plus the total surface disturbance area including well pads, collector pipelines, power lines, and access roads for groundwater development. For groundwater development areas, the existence of PPAs and RFFAs within the groundwater development area boundary within each hydrographic basin was used for evaluating potential cumulative effects.
- PPA footprints based on utility ROWs and other surface disturbing activities have been identified in BLM and other databases.

Groundwater Pumping

- The study area is the boundary for the groundwater model simulation.
- Time frame effects range from full build out of the project to full build out plus 200 years.
- Springs and streams are high value areas and impacts to them need to be quantified or, where possible, qualified as the best means for determining impacts to HMAs.
- ET areas mapped as Wetland/Meadow and Basin Shrubland cover types represent the primary cover types that would be affected by drawdown affects.
- An index drawdown contour of 10 feet is assumed to be a reasonable estimate of the point at which long-term changes to vegetation community vigor and composition would begin to appear (see Section 3.5, Vegetation Resources, for greater detail on the anticipated changes in response to drawdown).

3.13.3.4 Methodology for Analysis

Rights-of-way and Groundwater Development Area Construction and Facility Maintenance

- The cumulative surface disturbance effects to vegetation communities by hydrographic basin were estimated by overlaying the existing surface disturbances for PPAs, RFFAs, and the development areas for the project alternative being evaluated (Chapter 2, **Table 2.9-1**). The estimated cumulative surface disturbance was then compared with the overall area of the hydrographic basin affected. Potential effects on vegetation communities that occupy relatively small areas within individual basins, such as wetlands, were considered.
- Estimate of change to HMA carrying capacity and management based on short- and long-term displacement of forage vegetation.

Groundwater Pumping

- Wetland/Meadow and Basin Shrubland. The area enclosed by the maximum extent of the 10-foot drawdown contour was superimposed over the area of the primary ET units (Wetland/Meadow, Basin Shrubland cover types) to calculate the area of vegetation that could experience reductions in soil moisture and long-term vegetation community composition changes caused by groundwater drawdown of 10 feet or more at different points in time (full build out, full build out plus 75 years, and full build out plus 200 years). Figures were generated that illustrate the expansion of the 10-foot and greater drawdown contours over time in relation to the vegetation communities within the hydrographic ET boundaries. For more information on the analysis of drawdown effects see Section 3.5, Vegetation Resources.
- Springs and perennial stream reaches. The 10-foot drawdown index was applied to the springs and perennial stream reaches that were classified as being at risk from being affected by groundwater drawdown (Section 3.3, Water Resources). The springs included for analysis were those rated as presenting a "high" or "moderate" risk of effects. Springs are described as both field verified and unverified. Unverified springs have not been inventoried and, for purpose of analysis, their location comes from various map data sources. For greater distinction between and a more in-depth analysis see Section 3.3, Water Resources.

3.13.3.5 No Action

Groundwater Development

Under the No Action Alternative the project would not be constructed and there would be no maintenance. There would be no surface impacts to vegetation or affects to HMAs. Current environmental conditions would continue to influence the landscape and current land management objectives and activities would provide guidance.

Surface impacts would be compounded by recent projects that have not yet been reclaimed and those projects that are likely to occur in the foreseeable future (Chapter 2). These impacts could further reduce the amount of forage and disturb normal horse movement patterns. As the majority of the projects that are projected to occur in the future are related to power production or conveyance, additional surface disturbance is anticipated to be minimal. For more information regarding PPAs and RFFAs see Chapter 2, Section 2.9.

Groundwater Pumping

Table 3.13-11 summarizes the cumulative expansion of the 10-foot drawdown contour from existing pumping in relation to the potentially affected springs, potentially affected perennial stream segments, and acres of wetland/meadow and basin shrubland vegetation within HMAs for the No Action Alternative. This represents current trends based on environmental conditions and land management objectives and activities. The majority of the effects to springs, streams, and wetland/meadow and basin shrubland vegetation will occur in the Eagle HMA. The following is a summary of the incremental expansion of the groundwater drawdown area over time whose surface and groundwater supply may be reduced.

Full Build Out. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects would occur within the Eagle HMA. Similarly, the majority of the at-risk springs are also located within the Eagle HMA. Although there is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA, there are potential drawdown effects to springs.

Full Build Out Plus 75 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects would occur within the Eagle HMA. Similarly, the majority of the at-risk springs and perennial streams are also located within the Eagle HMA. Although there is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA, there are drawdown impacts to springs and perennial streams.

Full Build Out Plus 200 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects would occur within the Eagle HMA. Similarly, the majority of the at-risk springs and perennial streams are also located within the Eagle HMA. Although there is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA, there are drawdown impacts to springs and perennial streams.

Table 3.13-11 Summary of Potential Cumulative Pumping Effects with the No Action on Wild Horse Herd Management Areas

Parameter	HMA	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs (Verified/Unverified)[1]	Antelope	1/0	2/5	2/7
	Eagle	1/7	1/14	1/25
	Silver King	0/4	0/4	0/4
	Total	2/11	3/23	3/36
Miles of Perennial Streams	Eagle	0	1	12
Acres of Wetland/Meadow and Basin Shrubland Vegetation	Antelope Valley	15	153	194
	Eagle	1,473	2,511	2,524
	Total	1,488	2,664	2,718

[1] Unverified springs originate from map data sources and may change over time. Verified streams have been inventoried through field surveys.

3.13.3.6 Proposed Action

Rights-of-way and Groundwater Development

In addition to the temporary and permanent reductions in acreage due to ROW surface disturbanees (see Section 3.13.2.8) there would also be surface disturbanees related to groundwater development for which surface disturbance estimates have been made. PPAs include roads and other utility ROWs. All sources of surfaee disturbance would combine with the GWD Projeet and other foreseeable future actions (Chapter 2). These disturbanees could further reduce the amount of forage and disturb normal horse movement patterns. The Proposed Aetion surface disturbanee would overlap with two reasonably foreseeable future aetions loeated within areas oeeupied by wild horses. The Wilson Creek Wind Project transmission lines would utilize the LCCRDA corridor in Lake and Dry Lake Valleys where ROWs for the GWD Project eould be colloeated. The ON Transmission Line Project would share the same utility corridor with groundwater development facilities in Cave and Dry Lake valleys. For more information regarding PPAs and RFFAs see Chapter 2, Section 2.9.

Groundwater Pumping

Two to five HMAs within the water resources region of study would be affected by cumulative groundwater drawdown as predieted by the 10-foot or greater drawdown contour of the groundwater model (**Table 3.13-12**). Two HMAs would be at risk of impacts to forage vegetation at the time frame associated with full build out plus 200 years. Five would be at risk of impaets to springs and perennial streams. The incremental contribution of the Proposed Action pumping on the cumulative impacts to springs and streams is relatively small. The highest impact level would be at full build out plus 200 years when at risk springs comprise approximately 20 percent of the total impaet (**Figures 3.13-2** and **3.13-3**).

Full Build Out. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to wetland/meadow and basin shrubland vegetation occur within the Eagle HMA. The majority of the at-risk springs and wetland/meadow and basin shrubland vegetation are located within the Eagle HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. None of the eumulative impaets to springs, streams, or wetland/meadow or basin shrubland vegetation are the result of the Proposed Aetion pumping.

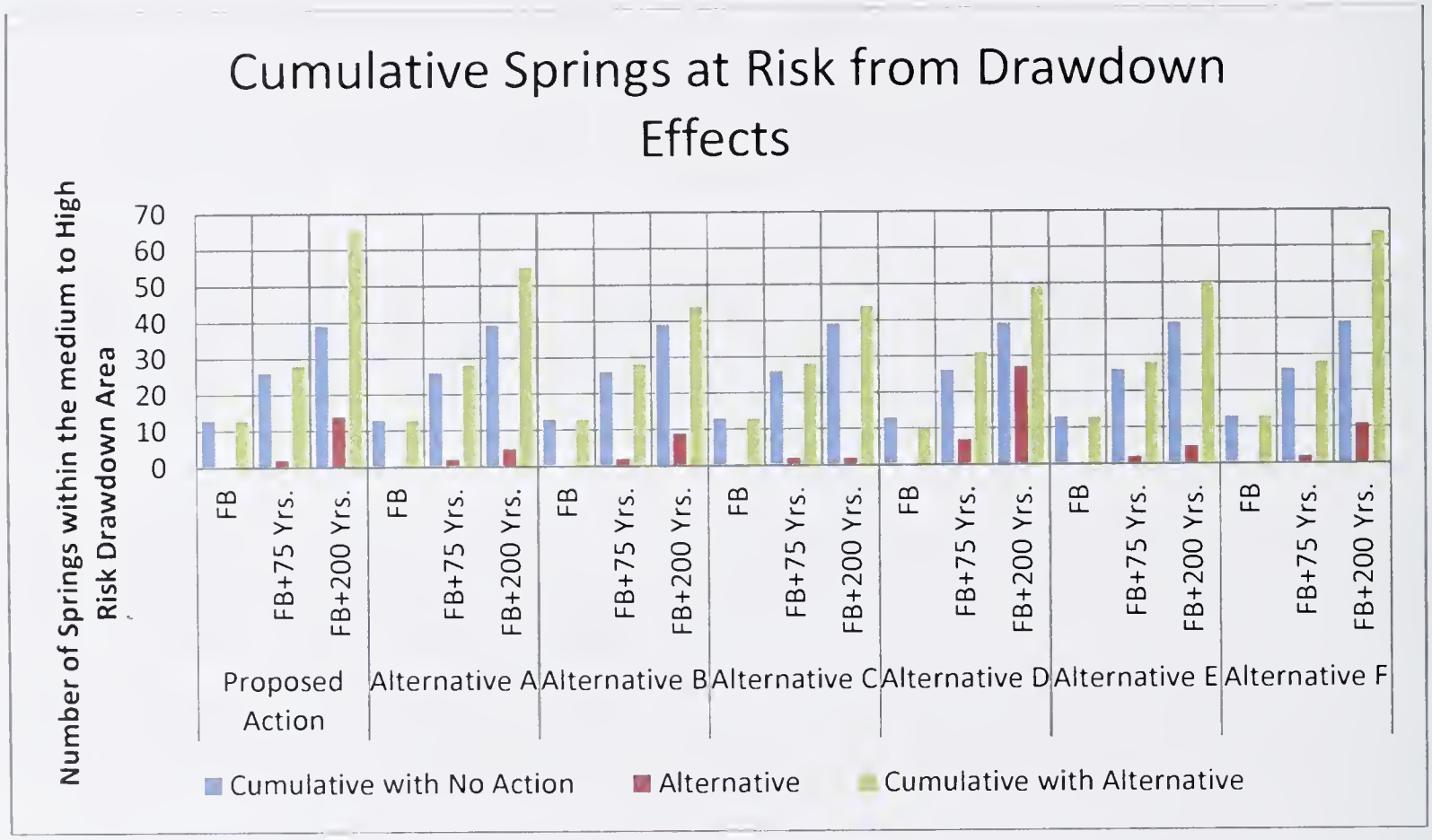
Full Build Out Plus 75 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effeets to wetland/meadow and basin shrubland vegetation and perennial streams oecur within the Eagle HMA. The majority of the at-risk springs are loeated within the Silver King HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown eontour of the groundwater model, approximately 7 percent of the cumulative impacts to springs is the result of the Proposed Aetion pumping. None of the cumulative impacts to perennial streams and wetland/meadow or basin shrubland vegetation are the result of the Proposed Action pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effeets to wetland/meadow and basin shrubland vegetation and perennial streams oecur within the Eagle HMA. The majority of the at-risk springs are loeated within the Eagle and Silver King HMAs. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 22 percent of the eumulative impacts to springs and 6 pereent to perennial streams are the result of the Proposed Action pumping. Approximately 92 percent of the eumulative impacts to wetland/meadow or basin shrubland vegetation is the result of the Proposed Action pumping.

Table 3.13-12 Summary of Potential Cumulative Pumping Effects with the Proposed Action on Wild Horse Herd Management Areas

Parameter	HMA	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs (Verified/Unverified)[1]	Antelope	1/0	2/5	2/28
	Eagle	1/7	2/15	2/29
	Silver King	0/4	0/4	0/4
	Total	2/11	4/24	4/61
Miles of Perennial Streams	Eagle	0	1	14
Acres of Wetland/Meadow and Basin Shrubland Vegetation	Antelope Valley	15	153	194
	Eagle	1,473	2,511	2,524
	Total	1,488	2,664	2,718

[1] Unverified springs originate from map data sources and may change over time. Verified springs have been inventoried through field surveys.



[1] Includes both verified and unverified springs. Unverified springs originate from map data sources and may change over time. Verified streams have been inventoried through field surveys.

Figure 3.13-2 Incremental Contribution of the Proposed Action and All Alternatives on Springs in Moderate to High Risk Areas within Herd Management Areas

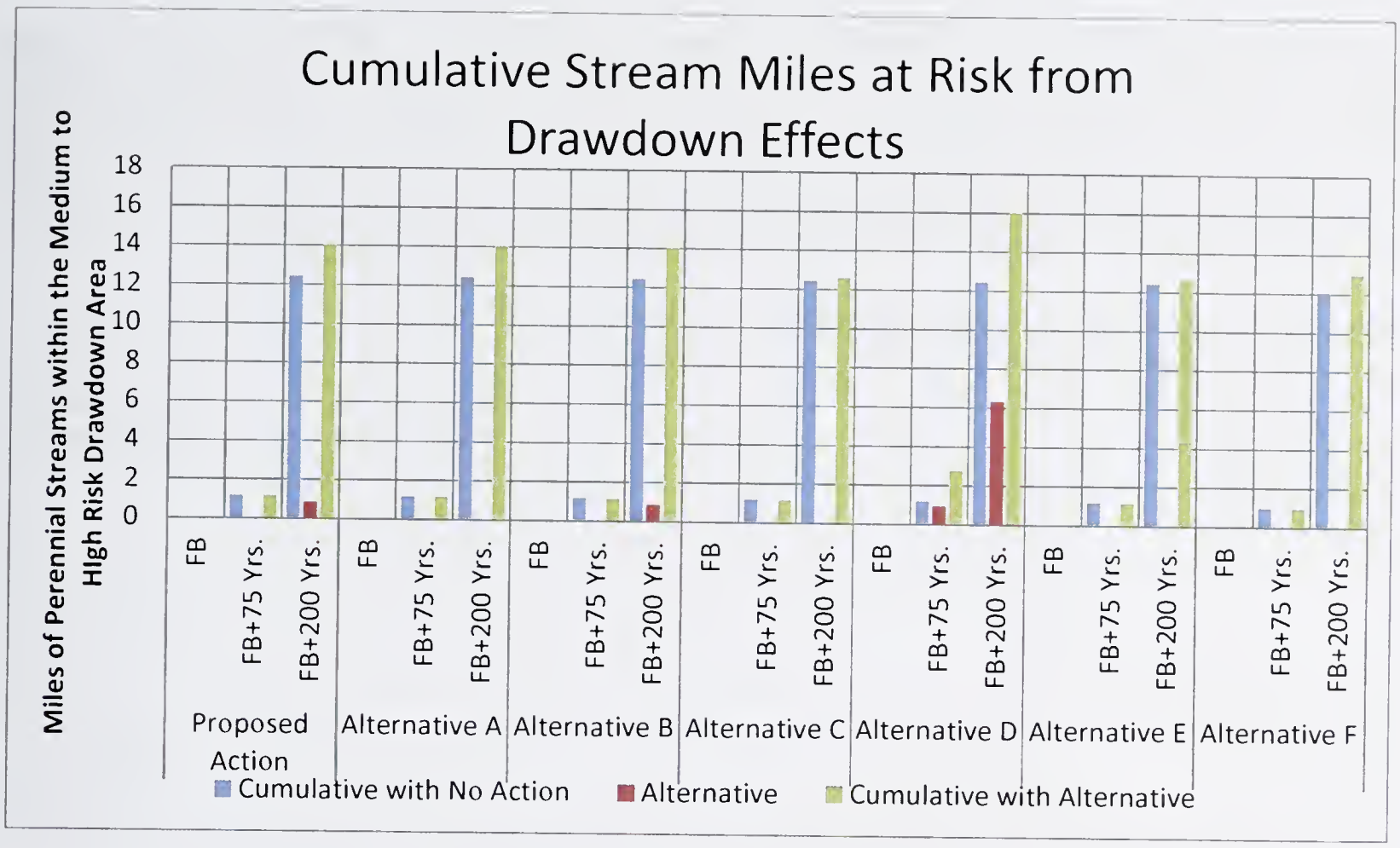


Figure 3.13-3 **Incremental Contribution of the Proposed Action and All Alternatives on Perennial Streams in Moderate to High Risk Areas within Herd Management Areas**

3.13.3.7 Alternative A

Groundwater Development

Alternative A surface disturbance overlap with foreseeable future projects in HMAs would be the same as for the Proposed Action and cumulative surface disturbance effects would be the same.

Groundwater Pumping

Some of the HMAs within the water resources region of study would see some impacts from the cumulative groundwater drawdown as predicted by the 10-foot or greater drawdown contour of the groundwater model (**Table 3.13-13**). The incremental contribution of Alternative A pumping on the cumulative impacts to springs and streams is relatively small. The most significant effect would be at full build out plus 200 years when at risk springs (both field verified and unverified) comprise less than 10 percent of the total impact (**Figures 3.13-2** and **3.13-3**).

Full Build Out. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to springs and wetland/meadow and basin shrubland vegetation occur within the Eagle HMA. No perennial streams are at risk at full build out. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, none of the cumulative impacts to springs, streams, and wetland/meadow or basin shrubland vegetation are the result of the Proposed Alternative pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to wetland/meadow and basin shrubland vegetation, springs, and perennial streams occur within the Eagle HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 7 percent of the cumulative impacts to springs is the result of the Alternative A pumping. None of the cumulative impacts to perennial streams and wetland/meadow or basin shrubland vegetation are the result of the Alternative A pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area of effeet overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effeets to wetland/meadow and basin shrubland vegetation, springs, and perennial streams oeeur within the Eagle HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 10 pereent of the eumulative impacts to springs and less than 1 pereent to perennial streams are the result of the Alternative A pumping. None of the eumulative impacts to wetland/meadow or basin shrubland vegetation are the result of the Alternative A pumping.

Table 3.13-13 Summary of Potential Cumulative Pumping Effects with Alternative A on Wild Horse Herd Management Areas

Parameter	HMA	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs (Verified/Unverified)[1]	Antelope	1/0	2/5	2/14
	Eagle	1/7	2/15	2/29
	Silver King	0/4	0/4	0/4
	Total	2/11	4/24	4/51
Miles of Perennial Streams	Eagle	0	1	14
Acres of Wetland/Meadow and Basin Shrubland Vegetation	Antelope Valley	15	153	194
	Eagle	1,473	2,511	2,524
	Total	1,488	2,664	2,718

[1] Unverified springs originate from map data sources and may change over time. Verified springs have been inventoried through field surveys.

3.13.3.8 Alternative B

Groundwater Development

Alternative B surface disturbanee overlap with foreseeable future projeets would be the same as for the Proposed Aetion and cumulative surface disturbanee impaets would be the same.

Groundwater Pumping

Some of the HMAs within the water resourees region of study would see some impacts from the eumulative groundwater drawdown as predieted by the 10-foot or greater drawdown eontour of the groundwater model (**Table 3.13-14**). The ineremental eontribution of Alternative B pumping on the eumulative impacts to springs and streams is relatively small. The greatest effeet would be at full build out plus 200 years when at risk springs (both field verified and unverified) eomprise approximately 20 pereent of the total impaet (**Figures 3.13-2** and **3.13-3**).

Full Build Out. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to springs and wetland/meadow and basin shrubland vegetation oeeur within the Eagle HMA. No perennial streams are at risk at full build out. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown eontour of the groundwater model, none of the eumulative impaets to springs, perennial streams, or wetland/meadow or basin shrubland vegetation are the result of the Alternative B pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area of effeet overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effeets to wetland/meadow and basin shrubland vegetation, springs and perennial streams oeeur within the Eagle HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown eontour of the groundwater model, approximately 7 pereent of the cumulative impacts to springs is the result of the Alternative B pumping. None of the eumulative impacts to perennial streams or wetland/meadow or basin shrubland vegetation are the result of the Alternative B pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effeets to wetland/meadow and basin shrubland vegetation, springs and perennial streams oecur within the Eagle HMA. There is no wetland/meadow or basin

shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 20 percent of the cumulative impacts to springs and 6 percent to perennial streams are the result of the Alternative B pumping. Approximately 92 percent of the cumulative impacts to wetland/meadow or basin shrubland vegetation is the result of the Alternative B pumping.

Table 3.13-14 Summary of Potential Cumulative Pumping Effects with Alternative B on Wild Horse Herd Management Areas

Parameter	HMA	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs (Verified/Unverified)[1]	Antelope	1/0	2/5	2/7
	Eagle	1/7	2/15	2/29
	Silver King	0/4	0/4	0/4
	Total	2/11	4/24	4/40
Miles of Perennial Streams	Eagle	0	1	14
Acres of Wetland/Meadow and Basin Shrubland Vegetation	Antelope Valley	15	153	194
	Eagle	1,740	2,511	2,524
	Total	1,755	2,664	2,718

[1] Unverified springs originate from map data sources and may change over time. Verified springs have been inventoried through field surveys.

3.13.3.9 Alternative C

Groundwater Development

Alternative C surface disturbance overlap with foreseeable future projects would be the same as for the Proposed Action and cumulative surface impacts would be the same.

Groundwater Pumping

Some of the HMAs within the water resources region of study would see some impacts from the cumulative groundwater drawdown as predicted by the 10-foot or greater drawdown contour of the groundwater model (**Table 3.13-15**). The incremental contribution of Alternative C pumping on the cumulative effects to springs and streams is relatively small. The largest effect would be at full build out plus 75 years when at risk springs (both field verified and unverified) comprise less than 7 percent of the total impact (**Figures 3.13-2** and **3.13-3**).

Full Build Out. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to springs and wetland/meadow and basin shrubland vegetation occur within the Eagle HMA. No perennial streams are at risk at full build out. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, none of the cumulative impacts to springs, streams or wetland/meadow or basin shrubland vegetation are the result of the Alternative C pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to wetland/meadow and basin shrubland vegetation, springs, and perennial streams occur within the Eagle HMA. The majority of the at-risk springs are located within the Silver King HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 7 percent of the cumulative impacts to springs is the result of the Alternative C pumping. None of the cumulative impacts to streams or wetland/meadow or basin shrubland vegetation are the result of the Alternative C pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to wetland/meadow and basin shrubland vegetation, streams, and perennial streams occur within the Eagle HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 5 percent of the cumulative impacts to springs is the result of the Alternative C pumping. None of the cumulative impacts to streams or wetland/meadow or basin shrubland vegetation are the result of the Alternative C pumping.

Table 3.13-15 Summary of Potential Cumulative Pumping Effects with Alternative C on Wild Horse Herd Management Areas

Parameter	HMA	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs (Verified/Unverified)[1]	Antelope	1/0	2/5	2/10
	Eagle	1/7	2/15	2/26
	Silver King	0/4	0/4	0/4
	Total	2/11	4/24	4/40
Miles of Perennial Streams	Eagle	0	1	12
Acres of Wetland/Meadow and Basin Shrubland Vegetation	Antelope Valley	15	153	194
	Eagle	1,473	2,511	2,524
	Total	1,488	2,664	2,718

[1] Unverified springs originate from map data sources and may change over time. Verified springs have been inventoried through field surveys.

3.13.3.10 Alternative D

Groundwater Development

Alternative D surface disturbance overlap with foreseeable future projects in HMAs would be the same as for the Proposed Action and cumulative surface disturbance impacts would be the same.

Groundwater Pumping

Some of the HMAs within the water resources region of study would see some impacts from the cumulative groundwater drawdown as predicted by the 10-foot or greater drawdown contour of the groundwater model (see **Table 3.13-16**). The incremental contribution of Alternative D on the cumulative effects to springs and streams would be greater than the Proposed Action or Alternatives A through C. At full build out plus 200 years Alternative D pumping would be responsible for approximately 55 percent of the cumulative impacts to at risk springs (both field verified and unverified) and 38 percent to at risk perennial streams (see **Figures 3.13-2** and **3.13-3**).

Full Build Out. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to springs and wetland/meadow and basin shrubland vegetation and springs occur within the Eagle HMA. No perennial streams are at risk at full build out. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, none of the cumulative impacts to springs, streams or wetland/meadow or basin shrubland vegetation are the result of the Alternative D pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to wetland/meadow and basin shrubland vegetation, springs, and perennial streams occur within the Eagle HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 23 percent of the cumulative impacts to springs and 35 percent to perennial streams are the result of the Alternative D pumping. None of the cumulative impacts to wetland/meadow or basin shrubland vegetation are the result of the Alternative D pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to wetland/meadow and basin shrubland vegetation, springs, and perennial streams occur within the Eagle HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 55 percent of the cumulative impacts to springs and 38 percent to perennial streams are the result of the Alternative D pumping. Approximately 92 percent of the cumulative impacts to wetland/meadow or basin shrubland vegetation is the result of the Alternative D pumping.

Table 3.13-16 Summary of Potential Cumulative Pumping Effects with Alternative D on Wild Horse Herd Management Areas

Parameter	HMA	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs (Verified/Unverified)[1]	Antelope	1/0	2/5	2/7
	Eagle	1/5	2/18	2/34
	Silver King	0/3	0/4	0/4
	Total	2/8	4/27	4/45
Miles of Perennial Streams	Eagle	0	3	16
Acres of Wetland/Meadow and Basin Shrubland Vegetation	Antelope Valley	15	153	194
	Eagle	626	2,511	2,524
	Total	641	2,664	2,718

[1] Unverified springs originate from map data sources and may change over time. Verified streams have been inventoried through field surveys.

3.13.3.11 Alternative E

Groundwater Development

Alternative E surface disturbance overlap with foreseeable future projects in HMAs would be the same as for the Proposed Action and cumulative surface disturbance effects would be the same.

Groundwater Pumping

Some of the HMAs within the water resources region of study would see some impacts from the cumulative groundwater drawdown as predicted by the 10-foot or greater drawdown contour of the groundwater model (**Table 3.13-17**). The incremental contribution of Alternative E pumping on the cumulative effects to springs and streams is relatively small. The most significant effect would be at full build out plus 200 years when at risk springs (both field verified and unverified) comprise 10 percent of the total impact (**Figures 3.13-2** and **3.13-3**).

Full Build Out. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to springs and wetland/meadow and basin shrubland vegetation and springs occur within the Eagle HMA. No perennial streams are at risk at full build out. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, none of the cumulative impacts to springs, streams, or wetland/meadow or basin shrubland vegetation are the result of the Alternative E pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to wetland/meadow and basin shrubland vegetation, springs, and perennial streams occur within the Eagle HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 7 percent of the cumulative impacts to springs is the result of the Alternative E pumping. None of the cumulative impacts to streams or wetland/meadow or basin shrubland vegetation are the result of the Alternative E pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to wetland/meadow and basin shrubland vegetation, springs, and perennial streams occur within the Eagle HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 10 percent of the cumulative impacts to springs is the result of the Alternative E pumping. None of the cumulative impacts to streams or wetland/meadow or basin shrubland vegetation are the result of the Alternative E pumping.

Table 3.13-17 Summary of Potential Cumulative Pumping Effects with Alternative E on Wild Horse Herd Management Areas

Parameter	HMA	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs (Verified/Unverified)[1]	Antelope	1/0	2/5	2/14
	Eagle	1/7	2/15	2/28
	Silver King	0/4	0/4	0/4
	Total	2/11	4/24	4/46
Miles of Perennial Streams	Eagle	0	1	13
Acres of Wetland/Meadow and Basin Shrubland Vegetation	Antelope Valley	15	153	194
	Eagle	1,473	2,511	2,524
	Total	1,488	2,664	2,718

[1] Unverified springs originate from map data sources and may change over time. Verified streams have been inventoried through field surveys.

3.13.3.12 Alternative F

Groundwater Development

Alternative F surface disturbance overlap with foreseeable future projects in HMAs would be the same as for the Proposed Action and cumulative surface disturbance effects would be the same.

Groundwater Pumping

Some of the HMAs within the water resources region of study would see some impacts from the cumulative groundwater drawdown as predicted by the 10-foot or greater drawdown contour of the groundwater model (**Table 3.13-18**). The incremental contribution of Alternative F pumping on the cumulative effects to springs and streams is relatively small. The most significant effect would be at full build out plus 200 years when at risk springs (both field verified and unverified) comprise 17 percent of the total impact (**Figures 3.13-2** and **3.13-3**).

Full Build Out. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to springs and wetland/meadow and basin shrubland vegetation and springs occur within the Eagle HMA. No perennial streams are at risk at full build out. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, none of the cumulative impacts to springs, streams, or wetland/meadow or basin shrubland vegetation are the result of the Alternative F pumping.

Full Build Out Plus 75 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to wetland/meadow and basin shrubland vegetation, springs, and perennial streams occur within the Eagle HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 7 percent of the cumulative impacts to springs is the result of the Alternative F pumping. None of the cumulative impacts to streams or wetland/meadow or basin shrubland vegetation are the result of the Alternative F pumping.

Full Build Out Plus 200 Years. The 10-foot drawdown area of effect overlaps with the Antelope, Antelope Valley, Eagle, and Silver King HMAs. The majority of the drawdown effects to wetland/meadow and basin shrubland vegetation, springs, and perennial streams occur within the Eagle HMA. There is no wetland/meadow or basin shrubland vegetation within the 10-foot or greater drawdown area in the Silver King HMA. Based on the 10-foot or greater drawdown contour of the groundwater model, approximately 17 percent of the cumulative impacts to springs and 47 percent of the cumulative impacts to wetland/meadow and basin shrubland are the result of the Alternative F pumping. None of the cumulative impacts to streams are the result of the Alternative F pumping.

Table 3.13-18 Summary of Potential Cumulative Pumping Effects with Alternative F on Wild Horse Herd Management Areas

Parameter	HMA	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Number of Springs (Verified/Unverified)[1]	Antelope	1/0	2/5	2/28
	Eagle	1/7	2/15	2/28
	Silver King	0/4	0/4	0/4
	Total	2/11	4/24	4/60
Miles of Perennial Streams	Eagle	0	1	13
Acres of Wetland/Meadow and Basin Shrubland Vegetation	Antelope Valley	15	153	194
	Eagle	1,473	2,511	2,524
	Total	1,488	2,664	2,718

[1] Unverified springs originate from map data sources and may change over time. Verified streams have been inventoried through field surveys.

3.14 Special Designations and Lands with Wilderness Characteristics

3.14.1 Affected Environment

3.14.1.1 Overview

Special designation areas are units of land that federal or state agencies manage for the protection and enhancement of specific resource values. This land includes wilderness, WSAs, Areas of Critical Environmental Concern (ACECs), and other special management areas (e.g., National Wildlife Refuges [NWRs] and ranges).

Wilderness areas are established by Congress in accordance with the Wilderness Act of 1964. Wilderness Areas are managed to preserve wilderness characteristics. WSAs contain wilderness characteristics and are managed to preserve those values until Congress either designates them as a wilderness area or releases them for other uses. Instant Study Areas (ISAs) are a type of WSA that contains primitive and natural qualities but are generally not recommended for wilderness. When the Federal Land Policy and Management Act (FLPMA) was passed in 1976, BLM was required to provide recommendations on wilderness areas formally identified as "natural" or "primitive" prior to Nov. 1, 1975 under Section 603 and those areas remain as ISAs. ACECs are BLM-designated areas where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, and other natural systems or processes. Many of the special designations are managed to maintain wilderness characteristics and cultural resources. In some instances, special designation areas promote the recovery of a specific species, such as the desert tortoise (BLM 2008, 1998; USFWS 2009).

QUICK REFERENCE

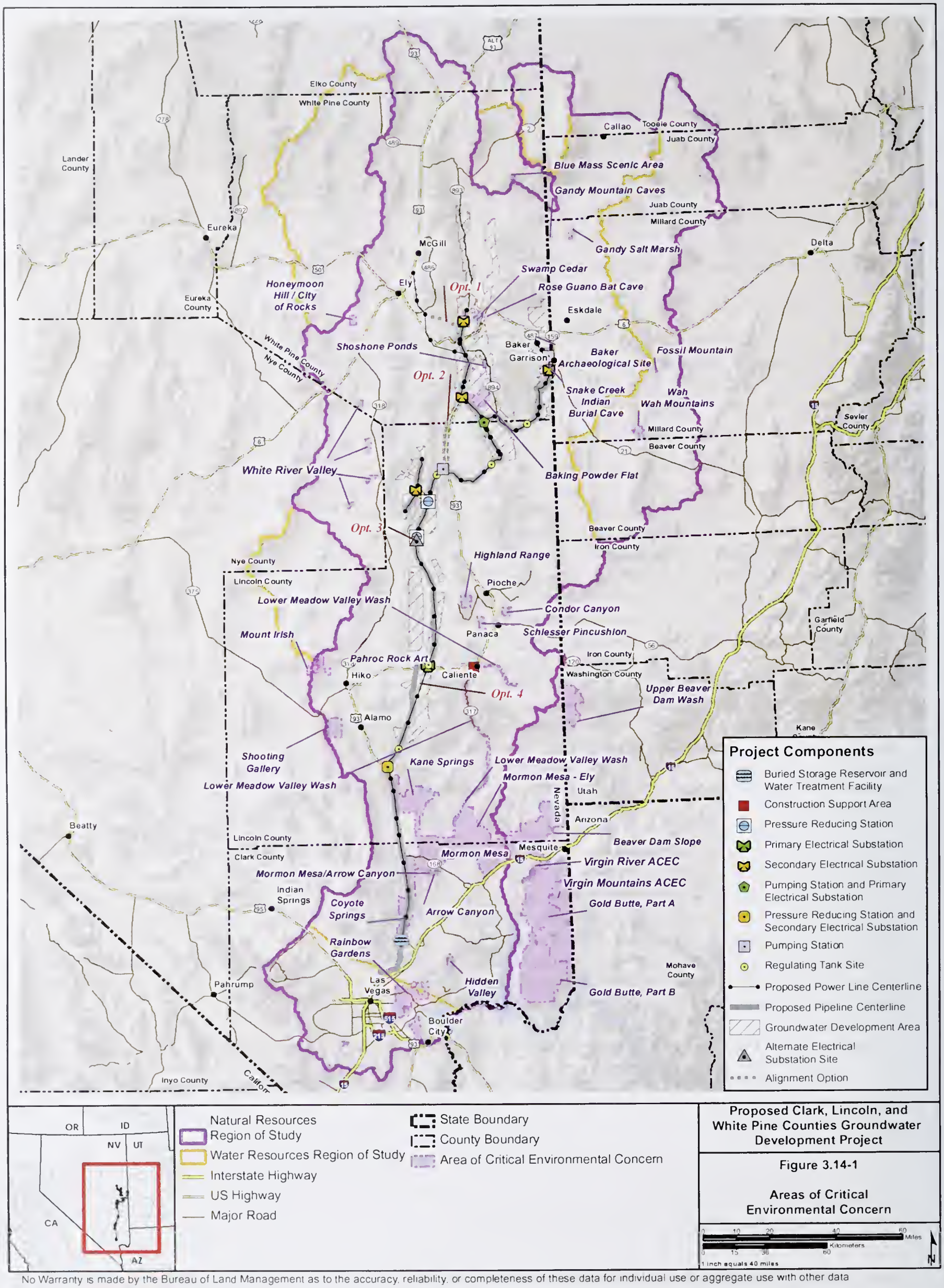
ACEC – Area of Critical Environmental Concern
ACM – Applicant Committed Protection Measures
GIS – Geographic Information System
ISA – Instant Study Area
LWC – Lands with Wilderness Characteristics
NDOW – Nevada Department of Wildlife
RFFA – Reasonably Foreseeable Future Actions
RMP – Resource Management Plan
ROW – Right-of-way
USFS – U.S. Forest Service
USFWS – U.S. Fish and Wildlife Service
WSA – Wilderness Study Area

To identify special designations within the region of study, data were collected from the BLM, the USFS, and the National Atlas. The region of study includes all land within 5 miles of the ROWs and ancillary facilities, groundwater development areas, and the associated hydrologic basins. As noted in **Table 3.14-1**, the majority of special designations are either wilderness areas or ACECs. The special designations that are within the region of study are shown in **Figures 3.14-1** and **3.14-2** and **Figures F3.14-1** and **F3.14-2** (**Appendix F**) and are listed in **Table 3.14-2**. There are no designated Wild and Scenic River segments in the region of study. However, there are two river segments on USFS lands in the northern part of the region of study identified as eligible for study under the Wild and Scenic Rivers Act: Muney Creek (wild) and Smith Creek (recreation, scenic, and wild).

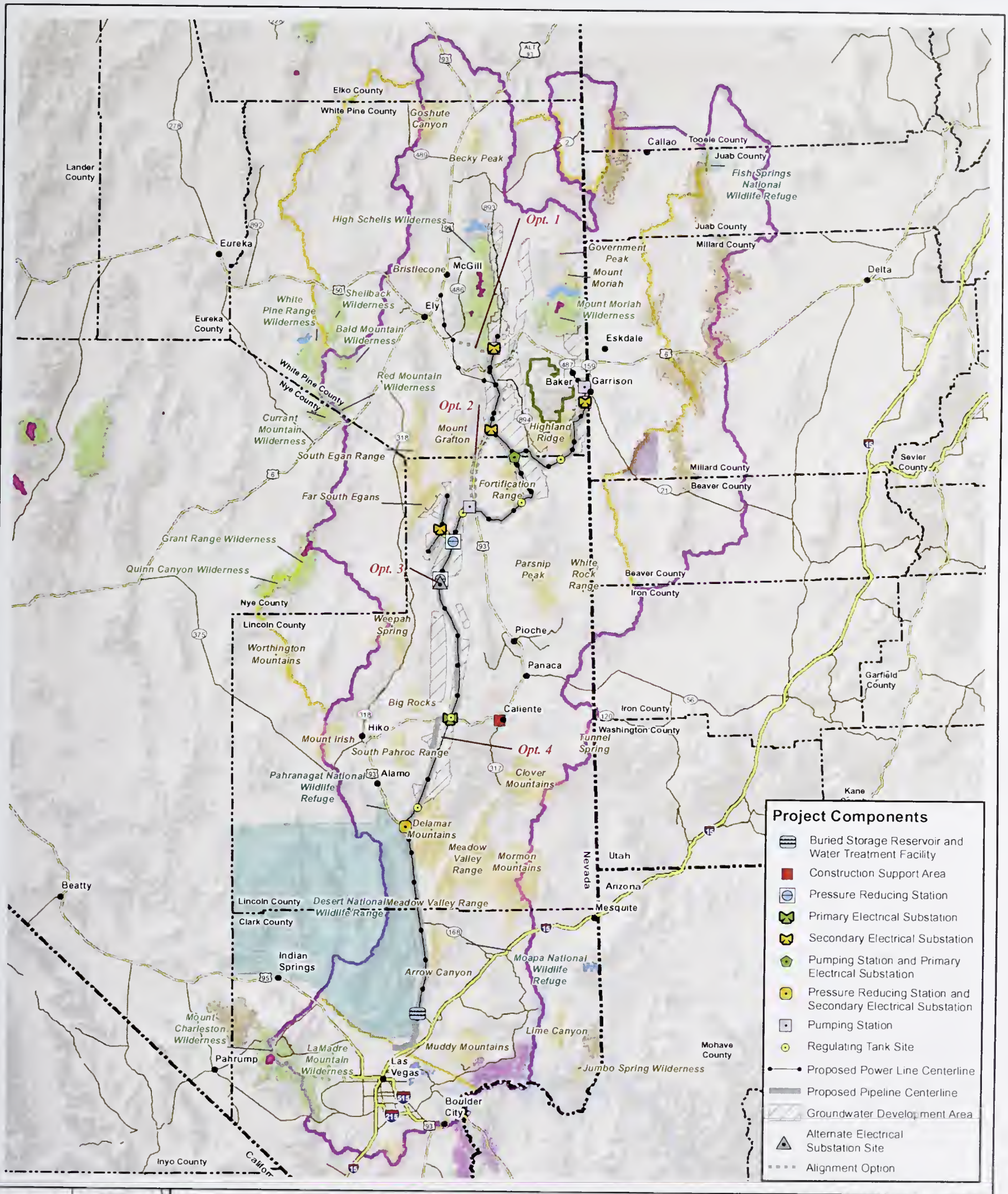
Table 3.14-1 Types and Occurrence of Special Designations Within the Region of Study

Types of Special Designations[1]	Number of Special Designations
Wilderness	29
ACECs	27
WSA/ISA	12
NWR/State Wildlife Management Areas	8
National Park/National Recreation Area	2

[1] Does not include the Desert Biosphere Reserve and Experimental Range.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

Table 3.14-2 Special Designations that Occur within the Region of Study

Responsible Agency	Name	Protected Resource	Total Acres of Area	Crossed by ROWs or Ancillary Facilities	Within Groundwater Development Areas
BLM	Arden ACEC /Desert Tortoise Conservation Center	Historic railroad construction and mining; desert tortoise	1,480	No	No
BLM	Arrow Canyon Wilderness	Wilderness characteristics	27,530	No	No
BLM	Baker Archaeological Site ACEC	Cultural resources	80	No	Yes
BLM	Baking Powder Flat ACEC	Protected butterfly	13,640	No	Yes
BLM	Becky Peak Wilderness	Wilderness characteristics	18,199	No	No
BLM	Big Rocks Wilderness	Wilderness characteristics	12,997	No	No
BLM	Bristlecone Wilderness	Wilderness characteristics	14,095	No	No
BLM	Clover Mountains Wilderness	Wilderness characteristics	85,784	No	No
BLM	Condor Canyon ACEC	Riparian habitat and scenic canyon	4,500	No	No
BLM	Conger Mountain WSA	Wilderness characteristics	20,400	No	No
BLM	Coyote Springs ACEC	Desert tortoise	51,549	Yes	No
BLM	Delamar Mountains Wilderness	Wilderness characteristics	111,328	No	No
BLM	Deep Creek Mountains WSA	Wilderness characteristics	68,910	No	No
BLM	Far South Egans Wilderness	Wilderness characteristics	36,384	No	No
BLM	Fish Springs WSA	Wilderness characteristics	52,500	No	No
BLM	Fortification Range Wilderness	Wilderness characteristics	30,656	No	No
BLM	Fossil Mountain ACEC	Prehistoric life form	1,920	No	No
BLM	Gandy Mountain Caves ACEC	Geologic feature	1,120	No	No
BLM	Gandy Salt Marsh ACEC	Unique biological and riparian	2,270	No	No
BLM	Goshute Canyon Wilderness	Wilderness characteristics	42,543	No	No
BLM	Government Peak Wilderness	Wilderness characteristics	6,313	No	No
BLM	Hidden Valley ACEC	Prehistoric habitation and rock art	3,360	No	No
BLM	Highland Range ACEC	Intermountain bristlecone pine woodland, montane shrublands, butterfly diversity	6,900	No	No
BLM	Highland Ridge Wilderness	Wilderness characteristics	6,900	No	No
BLM	Honeymoon Hill/City of Rocks ACEC	Rock art	3,900	No	No
BLM	Howell Peak WSA	Wilderness characteristics	24,800	No	No
BLM	Kane Springs ACEC	Desert tortoise	57,190	Yes	No
BLM	King Top WSA	Wilderness characteristics	84,770	No	No
BLM	Lower Meadow Valley Wash ACEC	Riparian and special status species	25,000	No	No
BLM	Meadow Valley Range Wilderness	Wilderness characteristics	123,500	No	No
BLM	Mormon Mesa – ACEC (Ely Office)	Desert tortoise	109,680	No	No
BLM	Mormon Mesa – ACEC (Las Vegas Office)	Desert tortoise	151,360	No	No

Table 3.14-2 Special Designations that Occur within the Region of Study (Continued)

Responsible Agency	Name	Protected Resource	Total Acres of Area	Crossed by ROWs or Ancillary Facilities	Within Groundwater Development Areas
BLM	Mormon Mountains Wilderness	Wilderness characteristics	157,938	No	No
BLM	Mount Grafton Wilderness	Wilderness characteristics	78,754	No	No
BLM	Mount Irish ACEC	Rock art	15,100	No	No
BLM	Mount Irish Wilderness	Wilderness characteristics	28,334	No	No
BLM/USFS	Mount Moriah Wilderness (includes Mount Moriah Research Natural Area [RNA])	Wilderness characteristics	8,691	No	No
BLM	Muddy Mountains WSA	Wilderness characteristics	96,170	No	No
BLM	North McCullough WSA	Wilderness characteristics	47,166	No	No
BLM	Notch Peak WSA	Wilderness characteristics	51,130	No	No
BLM	Pahroc Art ACEC	Rock art and rock shelters	2,400	No	No
BLM	Parsnip Peak Wilderness	Wilderness characteristics	43,693	No	No
BLM	Rainbow Gardens ACEC	Geological, scenic, scientific, cultural, and sensitive plant species	37,620	No	No
BLM	River Mountains ACEC	Bighorn sheep, scenic views	5,617	No	No
BLM	Rose Guano Bat Cave ACEC	Historic guano mine and cave	40	No	No
BLM	Schlesser/Pincushion ACEC	Schlesser Pincushion cactus	4,930	No	No
BLM	Scott's Basin WSA	Wilderness characteristics	6,990	No	No
BLM	Shooting Gallery ACEC	Rock art	15,600	No	No
BLM	Shoshone Ponds ACEC	Rocky Mountain juniper and protected fish species	1,240	No	No
BLM	South Pahroc Range Wilderness	Wilderness characteristics	25,800	No	No
BLM	Snake Creek Indian Burial Cave ACEC	Cultural resources	40	No	No
BLM	South Egan Range Wilderness	Wilderness characteristics	67,214	No	No
BLM	Sunrise Mountain ISA	Unique geologic, biologic, and aesthetic values	10,240	No	No
BLM	Swamp Cedar ACEC	Rocky Mountain juniper, other rare and endemic plant communities, and cultural resources	3,200	No	Yes
BLM	Swasey Mountain WSA	Wilderness characteristics	49,500	No	No
BLM	Wah Wah Mountains ACEC	Biological community	5,970	No	No
BLM	Wah Wah Mountains WSA	Wilderness characteristics	42,140	No	No
BLM	Weepah Spring Wilderness	Wilderness characteristics	51,480	No	No
BLM	White River Valley ACEC	Sensitive plants	13,100	No	No
BLM	White Rock Range Wilderness	Wilderness characteristics	24,413	No	No
USFS	Bald Mountain Wilderness	Wilderness characteristics	14,040	No	No
USFS	Desert Biosphere Reserve and Experimental Range	Agricultural range experiment station	55,680	No	No

Table 3.14-2 Special Designations that Occur within the Region of Study (Continued)

Responsible Agency	Name	Protected Resource	Total Acres of Area	Crossed by ROWs or Ancillary Facilities	Within Groundwater Development Areas
USFS	Grant Range Wilderness (ineludes Troy Peak RNA)	Wilderness eharaeteristics	52,600	No	No
USFS	High Schells Wilderness (ineludes North and South Schell Peaks and Cleve Creek Baldy RNAs)	Wilderness eharacteristics	121,497	No	No
USFS	La Madre Mountain Wilderness	Wilderness eharacteristies	47,267	No	No
USFS	Rainbow Mountain Wilderness	Wilderness eharaeteristies	25,113	No	No
USFS	Red Mountain Wilderness	Wilderness eharaeteristies	20,490	No	No
NPS	GBNP	National Park eneompassing Lehman Caves, bristlecone pine groves, and Wheelcr Peak.	77,100	No	No
NPS	Lake Mead	National Reereation Area	~1.5mm	No	No
NPS	Jimbilnan Wilderness	Wilderness characteristics	18,879	No	No
NPS	Pinto Valley Wilderness	Wildcrness eharacteristies	39,173	No	No
USFWS	Desert National Wildlife Range	Wildlife ineluding desert tortoisc and desert bighorn sheep	1,600,000	No	No
USFWS	Fish Springs NWR	Marsh system provides vital habitat for migrating wetland birds	17,992	No	No
USFWS	Pahranagat NWR	Migratory bird habitat and threatened and endangered speeies ineluding desert tortoise and southwestern willow flyeateher	5,308	No	No
USFWS	Moapa Valley NWR	Moapa Dace and other endangered, threatened, and candidate species	117	No	No
NV	Wayne E. Kirch State Wildlife Management Area	Lakes, wetlands, waterfowl, and public hunting grounds	14,815	No	No
NV	Key Pittman State Wildlife Management Area	Lakes, waterfowl, and public hunting grounds	1,332	No	No
NV	Steptoe Valley State Wildlife Management Area	Lakes, waterfowl, public boating, and publie hunting grounds	6,426	No	No
UT	Indian Peaks State Game Management Area	Mule deer and trophy bull elk habitat; fishing for rainbow trout	10,240	No	No

3.14.1.2 Right-of-way Areas

The proposed project ROWs or ancillary facilities would cross two ACECs—the Coyote Springs and Kane Springs ACECs. Both of these ACECs are managed to protect the desert tortoise. There are no other special designations, including wilderness areas, WSAs, or NWRs or ranges, crossed by the proposed project ROWs or ancillary facilities.

3.14.1.3 Groundwater Development Areas

Three ACECs—Baker Archaeological Site, Baking Powder Flat, and Swamp Cedar—fall within the groundwater development area boundaries. The ACECs are managed for a variety of purposes, including protection of rare plant and wildlife species and the protection of cultural sites. The groundwater development area boundaries were delineated to avoid ROW exclusion areas, including wilderness areas. There are no other special designations, including NWRs or ranges, within the groundwater development area boundaries.

While project ROW facilities and groundwater development are not planned in these areas, other special management areas within or near the water resources region of study are considered in this analysis. These areas include a National Park, Wildlife Management Areas, and NWRs.

Great Basin National Park

GBNP encompasses over 77,000 acres in White Pine County, south of Highway 50/6 and east of Highway 93. The Park was established in 1986 to protect a representative portion of the physiographic Great Basin region, which includes over 699 species of flora, including ancient bristlecone pines, over 300 species of fauna, 45 caves including Lehman Caves, and several rock glacier formations (e.g., cirques, moraines, alpine tarns), and the only glacier in the Great Basin region.

The management of human activities and natural resources is described in the GBNP General Management Plan (NPS 1992). The Planning Issues and Concerns section of this document provide an overview of the Park's management direction.

Lake Mead National Recreation Area

The Lake Mead National Recreation Area is located off of U.S. 93, southeast of Boulder City, Nevada. Lake Mead, the focal point of the National Recreation Area, was created by backing up the Colorado River behind the Hoover Dam. Lake Mead National Recreation Area was named the first national recreation area (in 1964) and has drawn hundreds of thousands of visitors to view the contrast of desert and water and the incredible structure that is Hoover Dam. The National Recreation Area includes two lakes and over 1.5 million acres of land.

Lake Mead National Recreation Area offers year-round recreational opportunities including boating, swimming, fishing, hiking, and sightseeing. It also is home to thousands of desert plants and animals, adapted to survive in an extreme place where rain is scarce and temperatures are high.

Wayne E. Kirch State Wildlife Management Area

The primary management emphasis on Wildlife Management Areas is the protection of wetlands and waterfowl including the use of the areas as public hunting and fishing grounds. The Wayne E. Kirch Wildlife Management Area is located in the White River Valley in northeastern Nye County, accessed via SR 318. The Wildlife Management Area is composed of a total of 14,815 acres, and includes five major reservoirs plus springs, marshes and wetlands; providing important nesting areas for waterfowl. The primary sources of water are Flag Springs and Hot Creek Spring.

Key Pittman State Wildlife Management Area

The Key Pittman Wildlife Management Area is located in the north end of the Pahranagat Valley between the Pahranagat Range to the west and the Hiko Range to the east; is approximately 135 miles south of Ely and 110 miles north of Las Vegas on Highway 318. The Wildlife Management Area is composed of 1,332 acres including Nesbitt and Frenchy Lakes and appropriated water rights totaling approximately 632 acre-feet annually from Hiko Springs managed by the Hiko Ditch Company and 580 acre feet annually from Crystal Springs. The Wildlife Management Area contains about 632 acres of wetlands and aquatic habitats consisting of lakes, fresh emergent wetlands, and wet meadow areas. Uplands total about 700 acres including alkali desert scrub, desert wash and croplands. The Wildlife Management Area supports an abundance of wildlife; more than 24 species of ducks have been recorded on the area in addition to raptors, wading birds, shorebirds, songbirds and other wetland-associated wildlife species.

Steptoe Valley State Wildlife Management Area

The Steptoe Valley Wildlife Management Area is located immediately south of Ely, along U.S. Highway 93/50 in White Pine County consisting 6,426 acres, it includes Comins Lake, which is located about six miles south of Ely.

Steptoe Creek, Cave Creek, and Comins Lake are the primary water resources on the Steptoe Valley Wildlife Management Area. Comins Lake, at the lower end of Steptoe and Cave Creek drainage basins, has a surface area of about 410 acres. The fauna is extremely diverse due to the mosaic of habitat types present. The Steptoe Valley is an important Great Basin stopover and resting area for waterfowl.

Desert National Wildlife Refuge

The approved refuge boundary of the Desert NWR encompasses approximately 1.6 million acres, in Clark County, Nevada, and includes other jurisdiction near eastern boundary of the Refuge along SH 93 (Summary Figure 3, USFWS 2009). The boundary of the Desert NWR was established in May 20, 1936 under Executive Order 7373 and later amended by the SNPLMA and the LCCRDA (Sprunger 2011). The refuge was established for the preservation and management of desert bighorn sheep and its habitat. All lands within the approved refuge boundary are managed to meet the mission and goals of the refuge as outlined in the approved Comprehensive Conservation Plan prepared pursuant to the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Uses within the approved refuge boundary that are incompatible with refuge mission and alignment of goals are identified as an impact.

Pahranagat National Wildlife Refuge

Pahranagat NWR is located approximately 90 miles north of Las Vegas in Lincoln County, Nevada. Located within the Pacific Flyway, Pahranagat NWR was established to provide habitat for migratory birds, especially waterfowl. The water for Pahranagat's lakes and marshes originates from the Ash and Crystal Springs to the north of the refuge and is managed to obtain the most value for wildlife. Various types of wetland habitats support many plants favored as food by over 230 species of migratory birds and other resident wildlife.

Moapa Valley National Wildlife Refuge

The Moapa Valley NWR was established to secure habitat for the endangered Moapa dace, a small fish commonly found throughout the headwaters of the Muddy River system. The refuge is located on 117 acres in northeastern Clark County and is approximately 60 miles north of Las Vegas, Nevada. Dace habitat within the refuge consists of stream channels supported by six thermal springs emerging near the center of the refuge.

3.14.1.4 Lands with Wilderness Characteristics

Managing the wilderness resource is part of the BLM's multiple use mission. Lands with wilderness characteristics (LWC) provide a range of uses and benefits in addition to their value as settings for solitude or primitive and unconfined recreation. Section 201 of the FLPMA requires the BLM to maintain, on a continuing basis, an inventory of all public lands and their resources and other values, which includes wilderness characteristics. Section 201 also provides that the preparation and maintenance of the inventory shall not, of itself, change or prevent change of the management or use of public lands. Regardless of past inventory, the BLM must maintain and update as necessary, its inventory of wilderness resources on public lands.

On June 1, 2011, the Secretary of the Department of the Interior issued a memorandum to the BLM Director that in part affirms BLM's obligations relating to wilderness characteristics under Sections 201 and 202 of FLPMA. BLM IM 2011-154 clarifies that the requirements of Sections 201 and 202 of FLPMA remain in effect. The BLM issued Manuals 6310 and 6320 on March 15, 2012, which solidifies the guidance provided in IM 2011-154. BLM manuals 6310 and 6320 provides guidance on how to conduct and maintain wilderness characteristics inventories and provide guidance on how to consider lands with wilderness characteristics. According to the these manuals, some of the circumstances identified where the BLM will consider whether to update a wilderness characteristics inventory or conduct a wilderness characteristics inventory for the first time include the following:

1. The public or the BLM identifies wilderness characteristics as an issue during the NEPA process.
2. The BLM has new information concerning resource conditions, including wilderness characteristics information submitted by the public that meets the BLMs minimum standard (as described in BLM policy IM 2011-154).
3. A project that may impact wilderness characteristics is undergoing NEPA analysis.

The primary function of an inventory is to determine the presence or absence of wilderness characteristics. The inventory for wilderness characteristics is based on criteria defined in Section 2(c) of the Wilderness Act and incorporated in Section 603 of the FLPMA for sufficient size, naturalness, outstanding opportunities for either solitude or primitive and unconfined recreation, and supplemental values (ecological, geological, or other features of scientific, educational, scenic, or historical values). If an inventory area does not meet at least one of the size criteria, it does not contain wilderness characteristics. The BLM may conduct the inventory of lands, including LWCs, using available information (e.g., existing maps, photos, records related to range projects, monitoring data) and field verification

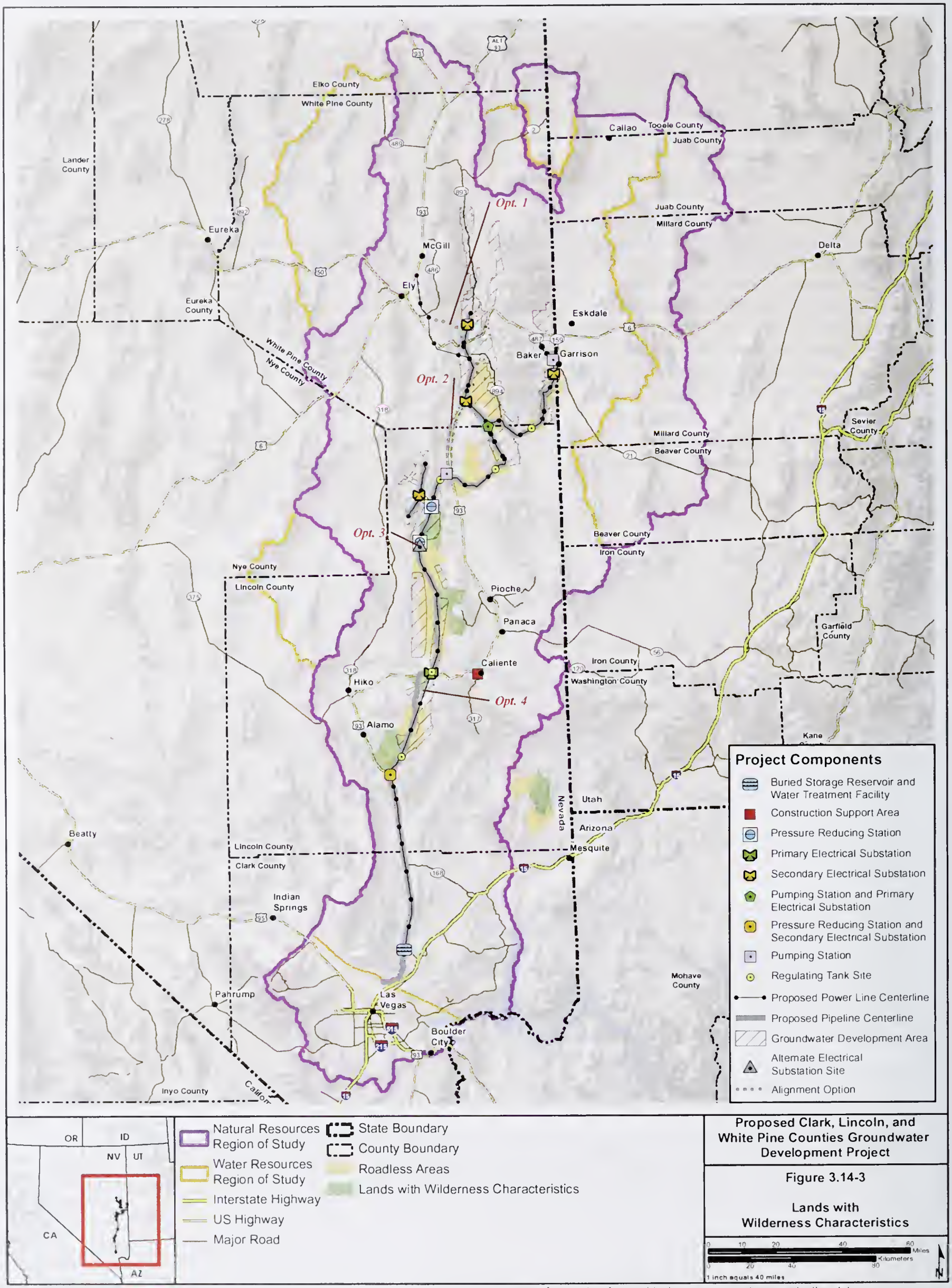
Many BLM field offices have retained, and in some cases maintained, the wilderness inventory units developed in their jurisdiction during the late 1970s. However, when no inventory units have been established or no land use plan decisions have been made regarding LWCs, proposed projects may be required to inventory and identify LWCs and analyze impacts to LWCs in the associated NEPA document. BLM reviewed the existing wilderness inventory conducted in 1979 to determine whether the project would directly affect any LWCs in the region of study. Then, BLM conducted a field inventory of identified units in April 2011 to verify the previous findings (Jacobson 2011). The inventory only addresses roadless units that the ROWs would bisect (**Table 3.14-3**). The remaining roadless areas were not evaluated for LWC, since the ROWs paralleled a roadless boundary and would not eliminate a roadless unit from being an LWC merely based on a size reduction or impair LWC criteria.

Table 3.14-3 Roadless Units Crossed by the Right-of-way and Ancillary Facilities

Unit ID	Size (Acres)	Sufficient Size	Naturalness	Solitude	Primitive and Unconfined Recreation	Supplemental Values	Lands with Wilderness Characteristics
177C-1-2011	19,564	yes	yes	no	no	n/a	no
183-1-2011	23,201	yes	yes	no	no	n/a	no
180-1-2011	50,635	yes	yes	no	no	n/a	no
220-1-2011	19,612	yes	yes	no	no	n/a	no
0106-2-2011	40,049	yes	yes	no	no	n/a	no
0135-2011	8,402	yes	no	no	no	n/a	no
108-2-2011	1,005	no	yes	no	no	n/a	no
108-1-2011	1,544	no	yes	no	no	n/a	no
110A-2-2011	5,765	yes	yes	no	no	n/a	no
186-2-2011	7,442	yes	yes	no	no	n/a	no
186-1-2011	1,447	no	yes	no	no	n/a	no
184-2011	6,138	yes	yes	no	no	n/a	no
186-4-2011	3,537	no	yes	no	no	n/a	no
177-1-2011	31,103	yes	yes	no	no	n/a, parts of former Fortification Range WSA	no
177A-1-2011	12,818	yes	yes	no	no	n/a	no
184B-2011	5,318	yes	yes	no	no	n/a, large wash feature	no
177C-2-2011	7,336	yes	yes	no	no	n/a	no
215-2011	31,736	yes	yes	yes	no	no	yes
214-1-2011	4,270	no	yes	no	no	n/a	no
216-2011	23,473	yes	yes	no	no	n/a	no
01R-12-5-2011	2,678	no	n/a	n/a	n/a	n/a	no
0136-1	12,921	yes	yes	yes	no	Joshua tree forest on eastern 2/3 of unit	yes
01R-29-1-2011	10,936	yes	yes	no	no	n/a	no

Source: Jacobson 2011.

Through this process, the BLM determined that there are 23 roadless units bisected by the proposed ROWs, two of which were found to meet LWC criteria (**Figure 3.14-3** and **Table 3.14-3**). Effects of future facilities on LWC areas would be completed in subsequent NEPA tiers when facility locations are known.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

3.14.2 Environmental Consequences

3.14.2.1 Rights-of-way

Issues

The following issues are evaluated for impacts to special designations from ROW construction and facility maintenance:

- Potential surface disturbance could be inconsistent with management prescriptions of special designations.
- Potential surface disturbance could be incompatible with the resource values that the special designations protect.
- Future special designation areas could be limited by the changes in land uses over the long-term.

Sections 3.3 (Water Resources), 3.5 (Vegetation), 3.6 (Terrestrial Wildlife), and 3.7 (Aquatic Biology Resources) discuss the potential effects on resources that many of these special designations protect. Section 3.15.2 (Visual Resources) discusses impacts to visually sensitive areas and Section 3.16 (Cultural Resources) discusses impacts to cultural resources.

Assumptions

The following assumptions were used in the impact analysis for special designations:

- Precautions would be taken to protect managed resources in utility corridors that are located within special designations.
- Facilities would not be approved in special designation areas identified as ROW exclusion areas.

Methodology for Analysis

Construction surface disturbance impacts by alternative were evaluated according to the following steps:

- Identification of impacts to special designation areas that could be affected by construction of the pipeline, power line, and ancillary facility ROWs;
- Identification of special designations within 5 miles of ROWs where land use and management changes would occur as a result of the project;
- Evaluation of agency management plans, intent of area designations, or agency mission and management prescriptions for designated resources;
- Evaluation of BLM RMP management actions, BMPs, and ACMs;
- Evaluation of existing mitigation measures and their effectiveness;
- Recommendation of additional mitigation measures to reduce or offset impacts; and
- Estimation of residual impacts after ACMs and recommended mitigation measures are applied.

3.14.2.2 Proposed Action, Alternatives A through C

Construction and Facility Maintenance

All Impact Issues

Although the project crosses two special designations, the proposed ROWs would be located within designated utility corridors in compliance with management prescriptions (see Section 3.8, Land Use and **Figure 3.8-5**). The Proposed Action and Alternatives A through C would require 306 miles of pipeline and 323 miles of power lines in Clark, Lincoln, and White Pine counties, Nevada. The acreage of surface disturbance from pipeline, power line, and associated facility construction and maintenance within special designations is summarized in **Table 3.14-4**. The BLM Coyote Springs ACEC has the largest affected acreage, followed by the BLM Kane Springs ACEC. The Coyote Springs and Kane Springs ACECs are both managed by the BLM to protect desert tortoise populations. Tortoise

populations would be indirectly affected by construction and facility maintenance due to improved public access, as discussed in Terrestrial Wildlife, Section 3.6.

Table 3.14-4 Special Designation Acreage Affected by Construction and Facility Maintenance of Rights-of-way and Ancillary Facilities, Proposed Action and Alternatives A through C

Special Designation	Construction[1]	Facility Maintenance[2]
BLM Coyote Springs ACEC	1,249	155
BLM Kane Springs ACEC	401	22
Total	**1,650**	**177**

[1] Acreage includes area disturbed during construction.

[2] Acreage includes areas where aboveground structures would be located.

The BLM Coyote Springs ACEC is identified as a ROW avoidance area, except within designated utility corridors. Placement of facilities on BLM-administered lands in ROW avoidance areas is subject to BLM approval depending on whether the uses are consistent with the special designation associated with the area. The water treatment facility and buried storage reservoir would be within the Coyote Springs ACEC, within the designated utility corridor. Impacts would likely be minimal because of the proposed facility's proximity to U.S. 93, near the easternmost edge of the ACEC. It is possible that facilities may need to be relocated to avoid long-term desert tortoise habitat loss. BLM authorization of a ROW in the Coyote Springs ACEC would need to follow all survey, stipulation, and monitoring requirements designed to protect desert tortoise (discussed in Section 3.6, Terrestrial Wildlife). During facility operation and maintenance, hazardous materials, such as standard water treatment chemicals, would be transported to and stored at the water treatment facility and buried storage reservoir site. If chemicals are spilled, they could cause damage to the area. Environmental damage from spills of stored hazardous chemicals at the water treatment facility in the Coyote Springs ACEC would be minimized by complying with a Stormwater Pollution Prevention Plan (SWPP Plan), developed in compliance with the CWA.

The BLM Kane Springs ACEC, managed for tortoise habitat, would experience impacts similar to those described for the Coyote Springs ACEC. Proposed construction within 5 miles of the ACEC may indirectly influence desert tortoise populations because of the operation of heavy machinery and vehicle traffic.

The Coyote Spring Valley Pressure Reducing Station would be located on BLM land adjacent to the eastern edge of the USFWS Desert National Wildlife Range, but within the acquisition boundary identified by the USFWS. The facility would be located within a designated utility corridor, and it would not conflict with the management prescriptions in this special designation. The operation and maintenance of this facility could limit the USFWS's ability to acquire and incorporate this relatively small portion of BLM land into the wildlife range.

Wilderness characteristics in adjacent wilderness areas, the USFS High Schells Wilderness Area, may be temporarily diminished during construction due to noise associated with heavy machinery and increased traffic occurring 1.7 miles east of the wilderness area boundary. Visitors in adjacent wilderness areas might notice a temporary disruption to solitude during construction. However, since all project construction would occur outside the wilderness area boundaries, no direct (permanent or physical) impacts to wilderness areas are anticipated.

ACMs would be implemented to avoid or minimize construction and maintenance-related effects on the resources protected by the special designations. Within desert tortoise habitat, such as the Coyote Springs, and Kane Springs ACECs, temporary desert tortoise exclusion fencing could be used to enclose active construction areas (ACM A.1.14). Permanent tortoise exclusion structures would be installed and maintained (along with site security fencing) around the above-ground facilities within desert tortoise habitat, such as the water treatment facility and buried storage reservoir (ACM A.1.16). If off-road vehicle travel is necessary within a designated ROW, a qualified biologist would first clear the proposed route (ACM A.1.11). Further ACMs regarding the desert tortoise can be found in Section 3.6, Terrestrial Wildlife.

Conclusion. The Coyote Springs ACEC and Kane Springs ACEC, would be directly affected by construction and maintenance of the ROWs and ancillary facilities. Surface disturbance from pipeline, power line, and associated facility

construction and maintenance within the Coyote Springs ACEC and Kane Springs ACEC may interfere with management objectives and would conflict with established management prescriptions, particularly for development proposed outside of designated utility corridors. In the Kane Springs and Coyote Springs ACECs, facility development may require additional measures to minimize effects on desert tortoise. Visitors in the adjacent USFS High Schells Wilderness Area might notice a temporary disruption to solitude during construction; however, no direct impacts to wilderness areas would be anticipated since project construction would occur outside the wilderness area boundaries.

Long-term impacts from the maintenance of above-ground facilities (e.g., structures, access roads, and power lines) would result within the boundaries of two special designations—Coyote Springs ACEC and Kane Springs ACEC. Improved public access would be anticipated to indirectly affect special designation area values. Long-term operation of the Coyote Spring Valley Pressure-reducing Station would limit the USFWS's ability to acquire and incorporate this relatively small portion of land into the wildlife range; however, this area is within a ROW corridor.

Proposed mitigation measures:

ROW-SD-1: Construction Area Siting. To the degree possible, avoid siting temporary construction areas within the boundaries of special designations and within designated ROW corridors. Effectiveness: This measure would be effective in avoiding impacts to special designations. Effects on other resources: There could be minimal effects of implementing this measure on transportation and associated air emissions if longer travel distances are required.

Mitigation measures required to address impacts to the areas designated to protect desert tortoise are discussed in Section 3.6, Terrestrial Wildlife.

Residual impacts include:

- Long-term maintenance of facilities that do not comply with the original intent of the resource protection management prescriptions within two special designations (the Kane Springs and Coyote Springs ACECs).

Lands with Wilderness Characteristics

The pipeline and power line ROWs would bisect two roadless units determined to meet LWC criteria: Units 215-2011 and 0136-1. Roadless Unit 215-2011 is 31,736 acres, contains one small fence line (50 feet) and numerous two-track routes, and contains outstanding opportunities for solitude on the eastern 1/3 of the unit. Roadless Unit 0136-1-2011 is 12,921 acres and contains a few two-track routes, some flagging for the On-Line power line project along the eastern boundary, and a landing strip on the north end, which would not be directly affected by the proposed project, as well as fences and range developments. On the eastern 2/3 of the unit, the Joshua tree forest allows for outstanding opportunities for solitude. The western 1/3 of the unit is very open, contains minimal topography, and does not contain outstanding values.

The ROWs would bisect the western edge of Unit 215-2011 and the middle portion of Unit 0136-1. The ROW would become the western boundary for Unit 215-2011 and would eliminate approximately 700 acres from the roadless unit. The remaining 31,000 acres would still meet the criteria for LWC. Unit 0136-1 would be split in two. The western portion, which does not contain outstanding opportunities for solitude and contains unnatural features (landing strip and fencelines), would be reduced to approximately 4,200 acres. The western portion would not meet the size criteria after the ROW is granted. The remaining 8,700 acres on the eastern portion of the unit would still meet the criteria for LWC.

Conclusion. The pipeline and power line ROWs would bisect two roadless units determined to meet LWC criteria: Units 215-2011 and 0136-1. The ROWs would eliminate 700 acres from Unit 215-2011, but the remaining 31,000 acres would still meet the criteria for LWC. The ROWs would eliminate 4,200 acres from Unit 0136-1, but the remaining 8,700 acres on the eastern portion of the unit would still meet the criteria for LWC.

Proposed mitigation measures:

None.

Residual impacts include:

- The ROWs would eliminate 700 acres from Unit 215-2011 and 4,200 acres from Unit 0136-1 as a result of the maintained roads associated with the ROWs.

3.14.2.3 Alternative D

Construction and Facility Maintenance

All Impact Issues

The same ROW construction and facility maintenance impacts discussed for the Proposed Action and Alternatives A through C would apply to Alternative D. Alternative D thereby would require 225 miles of pipeline and 208 miles of power lines in Clark and Lincoln Counties, Nevada. The acreage of surface disturbance from pipeline, power line, and associated facility construction and maintenance within special designations under Alternative D is summarized in **Table 3.14-5**.

Table 3.14-5 Special Designation Acreage Affected by Construction and Facility Maintenance of Rights-of-way and Ancillary Facilities – Alternative D

Special Designation	Construction[1]	Facility Maintenance[2]
BLM Coyote Springs ACEC	1,249	155
BLM Kane Springs ACEC	401	22
Total	**1,650**	**177**

[1] Acreage includes area disturbed during construction.

[2] Acreage includes areas where aboveground structures would be located.

Conclusion. The Coyote Springs ACEC and Kane Springs ACEC would be directly affected by construction and maintenance of the ROWs and ancillary facilities. Surface disturbance from pipeline, power line, and associated facility construction and maintenance within the Coyote Springs ACEC and Kane Springs ACEC may interfere with management objectives and would conflict with established management prescriptions, particularly for development proposed outside of designated utility corridors. In the Kane Springs and Coyote Springs ACECs, facility development may require additional measures to minimize effects on desert tortoise. Visitors in the adjacent USFS High Schells Wilderness Area might notice a temporary disruption to solitude during construction; however, no direct impacts to wilderness areas would be anticipated since project construction would occur outside the wilderness area boundaries.

Long-term impacts from the maintenance of above-ground facilities (e.g., structures, access roads, and power lines) would result within the boundaries of two special designations—Coyote Springs ACEC and Kane Springs ACEC. Improved public access would be anticipated to indirectly affect special designation area values. Long-term operation of the Coyote Spring Valley Pressure-reducing Station would limit the USFWS's ability to acquire and incorporate this relatively small portion of land into the wildlife range; however, this area is within a ROW corridor.

Proposed mitigation measures:

ROW-SD-1: Construction Area Siting. To the degree possible, avoid siting temporary construction areas within the boundaries of special designations and within designated ROW corridors. Effectiveness: This measure would be effective in avoiding impacts to special designations. Effects on other resources: There could be minimal effects of implementing this measure on transportation and associated air emissions if longer travel distances are required.

Mitigation measures required to address impacts to the areas designated to protect desert tortoise are discussed in Section 3.6, Terrestrial Wildlife.

Residual impacts include:

- Long-term maintenance of facilities that do not comply with the original intent of the resource protection management prescriptions within two special designations (the Kane Springs and Coyote Springs ACECs).

Lands with Wilderness Characteristics

Impacts to LWC would be the same as the Proposed Action. The pipeline and power line ROWs would bisect two roadless units determined to meet LWC criteria: Units 215-2011 and 0136-1. The ROWs would eliminate 700 acres from Unit 215-2011, but the remaining 31,000 acres would still meet the criteria for LWC. The ROWs would eliminate 4,200 acres from Unit 0136-1, but the remaining 8,700 acres on the eastern portion of the unit would still meet the criteria for LWC.

Conclusion: The pipeline and power line ROWs would bisect two roadless units determined to meet LWC criteria: Units 215-2011 and 0136-1. The ROWs would eliminate 700 acres from Unit 215-2011, but the remaining 31,000 acres would still meet the criteria for LWC. The ROWs would eliminate 4,200 acres from Unit 0136-1, but the remaining 8,700 acres on the eastern portion of the unit would still meet the criteria for LWC.

Proposed mitigation measures:

None.

Residual impacts include:

- The ROWs would eliminate 700 acres from Unit 215-2011 and 4,200 acres from Unit 0136-1 as a result of the maintained roads associated with the ROWs.

3.14.2.4 Alternatives E and F

Construction and Facility Maintenance

All Impact Issues

The same ROW construction and facility maintenance impacts discussed for the Proposed Action and Alternatives A through C would apply to Alternatives E and F. Alternatives E and F would require 263 miles of pipeline and 280 miles of power lines in Clark, Lincoln, and White Pine counties, Nevada. The acreage of surface disturbance from pipeline, power line, and associated facility construction and maintenance within special designations under Alternatives E and F is summarized in **Table 3.14-6**.

Table 3.14-6 Special Designations Affected by Construction and Facility Maintenance of Rights-of-way and Ancillary Facilities, Alternatives E and F

Special Designation	Construction[1]	Facility Maintenance[2]
BLM Coyote Springs ACEC	1,249	155
BLM Kane Springs ACEC	401	22
Total	**1,650**	**177**

[1] Acreage includes area disturbed during construction.

[2] Acreage includes areas where aboveground structures would be located.

Conclusion. The Coyote Springs ACEC and Kane Springs ACEC would be directly affected by construction and maintenance of the ROWs and ancillary facilities. Surface disturbance from pipeline, power line, and associated facility construction and maintenance within the Coyote Springs ACEC and Kane Springs ACEC may interfere with management objectives and would conflict with established management prescriptions, particularly for development proposed outside of designated utility corridors. In the Kane Springs and Coyote Springs ACECs, facility development may require additional measures to minimize effects on desert tortoise. Visitors in the adjacent USFS High Schells Wilderness Area might notice a temporary disruption to solitude during construction; however, no direct impacts to wilderness areas would be anticipated since project construction would occur outside the wilderness area boundaries.

Long-term impacts from the maintenance of above-ground facilities (e.g., structures, access roads, and power lines) would result within the boundaries of two special designations—Coyote Springs ACEC and Kane Springs ACEC. Improved public access would be anticipated to indirectly affect special designation area values. Long-term operation of the Coyote Spring Valley Pressure-reducing Station would limit the USFWS's ability to acquire and incorporate this relatively small portion of land into the wildlife range; however, this area is within a ROW corridor.

Proposed mitigation measures:

ROW-SD-1: Construction Area Siting. To the degree possible, avoid siting temporary construction areas within the boundaries of special designations and within designated ROW corridors. Effectiveness: This measure would be effective in avoiding impacts to special designations. Effects on other resources: There could be minimal effects of implementing this measure on transportation and associated air emissions if longer travel distances are required.

Mitigation measures required to address impacts to the areas designated to protect desert tortoise are discussed in Section 3.6, Terrestrial Wildlife.

Residual impacts include:

- Long-term maintenance of facilities that do not comply with the original intent of the resource protection management prescriptions within two special designations (the Kane Springs and Coyote Springs ACECs).

Lands with Wilderness Characteristics

Impacts to LWC would be the same as the Proposed Action. The pipeline and power line ROWs would bisect two roadless units determined to meet LWC criteria: Units 215-2011 and 0136-1. The ROWs would eliminate 700 acres from Unit 215-2011, but the remaining 31,000 acres would still meet the criteria for LWC. The ROWs would eliminate 4,200 acres from Unit 0136-1, but the remaining 8,700 acres on the eastern portion of the unit would still meet the criteria for LWC.

Conclusion. The ROWs would bisect two roadless units determined to meet LWC criteria: Units 215-2011 and 0136-1. The ROWs would eliminate 700 acres from Unit 215-2011, but the remaining 31,000 acres would still meet the criteria for LWC. The ROWs would eliminate 4,200 acres from Unit 0136-1, but the remaining 8,700 acres on the eastern portion of the unit would still meet the criteria for LWC.

Proposed mitigation measures:

None.

Residual impacts include:

- The ROWs would eliminate 700 acres from Unit 215-2011 and 4,200 acres from Unit 0136-1 as a result of the maintained roads associated with the ROWs.

3.14.2.5 Alignment Options 1 through 4

Impacts for the Alignment Options (1 through 4) are identified in relation to the relevant segment of the Proposed Action (**Table 3.14-7**).

Table 3.14-7 Special Designations Impact Summary for Alignment Options 1 through 4

Alignment Option	Analysis
Alignment Option 1 (Humboldt-Toiybe Power Line Alignment) **Option Description**: Change the locations of a portion of the 230-kV power line from Gonder Substation near Ely to Spring Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F	• Impacts to special designations associated with Alignment Option 1 would result in the same impacts as discussed for the Proposed Action. • Impacts to LWC associated with Alignment Option 1 would result in the same impacts as discussed for the Proposed Action.
Alignment Option 2 (North Lake Valley Pipeline Alignment) **Option Description**: Change the locations of portions of the mainline pipeline and electrical transmission line in North Lake Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Impacts to special designations associated with Alignment Option 2 would result in the same impacts as discussed for the Proposed Action. The alignment would pass near the Mount Grafton Wilderness Area, temporarily disrupting solitude because of ROW disturbance. • Impacts to LWC associated with Alignment Option 2 would result in the same impacts as discussed for the Proposed Action.
Alignment Option 3 (Muleshoe Substation and Power Line Alignment) **Option Description**: Eliminate the Gonder to Spring Valley transmission line, and construct a substation with an interconnection with an interstate, high voltage power line in Muleshole Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Impacts to special designations as associated with Alignment Option 3 would result in the same impacts discussed for the Proposed Action. • Impacts to LWC associated with Alignment Option 3 would result in the same impacts as discussed for the Proposed Action.
Alignment Option 4 (North Delamar Valley Pipeline and Power Line Alignment) **Option Description**: Change the location of a short section of mainline pipeline in Delamar Valley to follow an existing transmission line. **Applicable To**: All alternatives.	• Impacts to special designations as associated with Alignment Option 4 would result in the same impacts as discussed for the Proposed Action. • Impacts to LWC associated with Alignment Option 4 would result in fewer impacts than the Proposed Action. The ROWs would only bisect one of the two roadless units determined to meet LWC criteria, Unit 215-2011. Alignment Option 4 would bypass Unit 0136-1 on the eastern boundary.

3.14.2.6 No Action

Under the No Action Alternative, project construction and operation would be limited to currently approved actions. Management direction on BLM public lands would be directed by the Ely and Las Vegas RMPs, which have specific management prescriptions for special designations. Use and protection of special designations that are managed by other federal and state agencies would comply with those agencies' specific management plans and guidelines.

3.14.2.7 Comparison of Alternatives

Table 3.14-8 provides a comparison of impacts for construction and facility maintenance of the action alternatives on special designations and LWC.

Table 3.14-8 Comparison of Alternatives and Options – Rights-of-way

Parameter	Proposed Action, Alternatives A through C	Alternative D	Alternatives E and F
Number of special designations directly affected	2	2	2
Acres of special designations affected by construction	1,650	1,650	1,650
Acres of special designations affected by facility maintenance	177	177	177
Number of LWC bisected	2	2	2

3.14.2.8 Groundwater Development and Groundwater Pumping

Issues

The following issues are evaluated for impacts to special designations from groundwater development and groundwater pumping:

- Surface disturbance could be inconsistent with management prescriptions and diminish or impair values of special designations.
- Special designations that contain water-dependent values, including phreatophytic vegetation, wet meadows, springs, and streams, could be affected by the drawdown effects from groundwater pumping.
- Areas eligible for special designations could be limited by impaired or diminished values over the long-term.

Sections 3.3, Water Resources; 3.5, Vegetation Resources; 3.6, Terrestrial Wildlife; and 3.7, Aquatic Biology Resources discuss the potential effects on resources that many of these special designations protect. A discussion of impacts to visually sensitive areas is in Section 3.15.2 and Section 3.16 discusses impacts to cultural resources.

Assumptions

The following assumptions were used in the impact analysis for special designations:

- Precautions would be taken to protect resources and important values that contribute to the special designation.
- Facilities would not be approved in special designation areas identified as ROW exclusion areas.
- Assumptions about the potential changes in water-dependent resources from groundwater pumping do not incorporate additional assumptions about the effects of climate change because specific long-term effects of climate change are not presently known, and the incremental contribution of climate change effects to project effects cannot be reasonably estimated. A general discussion of climate change effects is provided in Section 3.1.3.2, Climate Change Effects to All Other Resources.

Methodology for Analysis

Groundwater development and groundwater pumping impacts by alternative were evaluated according to the following steps:

- Evaluation of agency management plans, intent of area designations, or agency mission and management prescriptions for designated areas;
- Identification of special designations that overlap with groundwater development areas that could be affected by future facilities;
- Generalization of construction effects in Cave, Delamar, Dry Lake, Snake, and Spring valleys due to the current unknown locations of wells and facilities needed for pumping at this stage of the project;
- Identification of special designations with water-dependent values that could be affected by groundwater drawdown;
- The COM Plan Framework will integrate protective measures from the following: BLM Land and RMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan Framework are provided in Section 3.20 along with measures to protect special designation areas and lands with wilderness characteristics from groundwater pumping activities.
- Evaluation of BLM RMP management actions, BMPs, and ACMs;
- Evaluation of existing mitigation measures and their effectiveness;
- Recommendation of additional mitigation measures to reduce or offset impacts; and
- Estimation of residual impacts after ACMs and recommended mitigation measures are applied.

- Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

Effects of future facilities on LWC areas would be completed in subsequent NEPA analyses when facility locations are known.

3.14.2.9 Proposed Action

Groundwater Development Area

The impact of constructing wells, roads, collector pipelines, and power distribution lines in Delamar, Dry Lake, Cave, Spring, and Snake valleys would be similar to those that are discussed for the construction of pipelines, power lines, and related facilities (Section 3.14.2.1). **Table 3.14-9** lists the acreage of the three special designations that could be affected by facilities proposed in the groundwater development areas. All of the BLM Baking Powder Flat and Swamp Cedar ACECs and just under half of the Baker Archeological Site ACEC fall within the groundwater development area boundaries. All three ACECs are managed as ROW avoidance areas, but ROWs might be granted if minimal conflict existed with the identified resource values and if impacts could be mitigated (BLM 2008). Although placing groundwater development areas within avoidance areas is not prohibited in these areas, the construction and operation of wells and associated facilities might affect the resources and important values within them.

If future facilities are constructed within the ACEC boundaries, the associated surface disturbance and resulting facilities could diminish and possibly impair the values for which the ACEC was designated. Areas of vegetation and habitat in the Baking Powder Flat and Swamp Cedar ACECs could be removed and altered by the project, depending on the extent of the project approved in these ACECs. The resulting aboveground facilities could impair the cultural resources setting in the Baker Archeological Site and Swamp Cedar ACECs. Long-term maintenance of facilities requiring increased use of heavy equipment and traffic in the area could conflict with values of ACEC special designations. Increased visitation also could result from improved public access and affect how the ACECs are managed and the condition of resources within them.

Table 3.14-9 Special Designations within the Groundwater Development Areas for the Proposed Action

Special Designation	Hydrologic Basin	Resource Value	Area within Groundwater Development Areas (Acres)	Percent of Total Area
Baker Archaeological Site ACEC	Snake Valley	Cultural resources	38	48
Baking Powder Flat ACEC	Spring Valley	Sensitive butterfly habitat	13,638	99.9
Swamp Cedar ACEC	Spring Valley	Rocky Mountain juniper in alkali valley soils, cultural resources	3,200	100

Wilderness characteristics in wilderness areas adjacent to the groundwater development areas may be temporarily diminished during construction due to noise associated with heavy machinery and increased traffic depending on the proximity of these activities to the wilderness area boundary. Visitors in adjacent wilderness areas might notice a temporary disruption to solitude during construction. However, since all project construction would occur outside the wilderness area boundaries, no direct (permanent or physical) impacts to wilderness areas are anticipated. The following wilderness areas could be temporarily and indirectly affected, depending on the proximity of activities to the wilderness boundary: High Schells, Mount Moriah, Highland Ridge, Fortification Range, Far South Egans, Big Rocks, and Delamar Mountains.

Conclusion. All of the BLM Baking Powder Flat and Swamp Cedar ACECs and just under half of the Baker Archeological Site ACEC fall within the groundwater development area boundaries. All three ACECs are managed as ROW avoidance areas, but ROWs might be granted if minimal conflict existed with the identified resource values and

if impacts could be mitigated (BLM 2008). If future facilities are constructed within the ACEC boundaries, the associated surface disturbance and resulting facilities could diminish and possibly impair the values for which the ACEC was designated. Wilderness characteristics in wilderness areas adjacent to the groundwater development areas may be temporarily diminished during construction due to noise associated with heavy machinery and increased traffic, depending on the proximity of these activities to the wilderness area boundary.

Proposed mitigation measures:

GW-SD-1: Avoid New Disturbance in ACECs. To the degree possible, avoid new surface disturbance in ACECs outside of utility corridors when planning well locations and roads. Effects on other resources: There could be minimal effects of implementing this measure on transportation and associated air emissions if longer travel distances are required.

Mitigation measure ROW-SD-1 (Construction area siting) also applies to groundwater development.

Potential residual impacts include:

- If future facilities are constructed within the ACEC boundaries, the associated surface disturbance and resulting facilities could diminish and possibly impair the values for which the ACEC was designated. This impact could occur in three ACECs—Baking Powder Flat, Swamp Cedar, and Baker Archeological Site ACECs. Temporary, indirect effects to wilderness characteristics could occur in the following wilderness areas depending on the proximity of construction activities to the wilderness area boundary: High Schells, Mount Moriah, Highland Ridge, Fortification Range, Far South Egans, Big Rocks, and Delamar Mountains.

Groundwater Pumping

Special designations that contain water-dependent values, including phreatophytic vegetation, wet meadows, springs, and streams, could be affected by the drawdown from groundwater pumping. Drawdown effects may reduce flow to ponds, springs, and perennial streams and alter vegetation, which could affect the values of the special designation areas. More details on the anticipated changes in overall plant communities and wildlife habitat are provided in Vegetation, Section 3.5; Terrestrial Wildlife, Section 3.6; and Aquatic Biological Resources, Section 3.7.

Gradual changes in wetland meadow and phreatophyte (i.e., basin shrubland) vegetation communities from groundwater drawdown could adversely affect water– and wildlife–related values in special management areas. The analysis was conducted on areas where the 10-foot drawdown overlapped with areas of groundwater shallower than 50 feet (detailed in Section 3.5.2.8, Vegetation Resources). In total, pumping could adversely affect wetland meadow and phreatophytic vegetation in five special designations (**Table 3.14-10**), with the most area affected in the Baking Powder Flat, Shoshone Ponds, and Swamp Cedar ACECs. Vegetation changes in these areas could affect the resources being protected by the ACEC designation, compromising the objective of the designation. While changes in wetland meadow and phreatophyte vegetation could affect migratory bird habitat within the Pahranagat NWR, drawdown effects would not be anticipated to compromise the objectives of the designation.

Table 3.14-10 Acres of Wetland Meadow and Phreatophytic Vegetation Areas within Special Designations Affected under the Proposed Action

Special Designation	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Baking Powder Flat ACEC	1,475	9,546	9,546
Lower Meadow Valley Wash ACEC	0	0	78
Pahranagat NWR	0	0	225
Shoshone Ponds ACEC	0	1,021	1,021
Swamp Cedar ACEC	93	3,163	3,163
Total	**1,568**	**13,730**	**14,033**

Reductions of perennial streams and spring flows in special designations have the potential to adversely affect resources dependent upon those water resources including riparian and wetland vegetation. Special designations projected to have perennial streams and springs with moderate to high risk for reduced flows from groundwater drawdown are provided in **Tables 3.14-11** and **3.14-12**. Water level changes in the springs and streams of the Shoshone Ponds, and Lower Meadow Valley Wash ACECs could affect the resources being protected by the ACEC designation, compromising the objective of the designation. Drawdown effects in the Pahranagat NWR could affect migratory bird habitat, but would not be anticipated to compromise the objectives of the NWR designation. Drawdown effects on springs and streams in the High Schells and Mount Grafton Wilderness Areas could affect some forms of primitive recreation dependent on the water sources, but would not be anticipated to compromise the objectives of the wilderness designation.

Table 3.14-11 Number of Springs in Special Designations at Risk[1] of Being Affected By Drawdown Due to Proposed Action Pumping

Special Designation	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Baking Powder Flat ACEC	0	1	1
High Schells USFS Wilderness	0	0	1
Mount Grafton Wilderness	0	0	3
Shoshone Ponds ACEC	0	5	5

[1] Impacts would include effects on riparian and wetland vegetation.

Table 3.14-12 Miles of Perennial Streams in Special Designations at Risk[1] of Being Affected By Drawdown Due to Proposed Action Pumping

Special Designation	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
High Schells USFS Wilderness	0	<1	1
Lower Meadow Valley Wash ACEC	0	0	3
Pahranagat NWR	0	0	<1

[1] Impacts would include effects on riparian and wetland vegetation.

As discussed in Water Resources, mitigation measure GW-WR-7 would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies (see water resource monitoring measure GW-WR-3a). If monitoring indicates that impacts are occurring or likely will occur in the future and are likely to cause or contribute to unnecessary or undue degradation to federal resources and water rights, the BLM would determine if emergency action or a mitigation plan is required. The emergency action would involve the BLM issuing a "Cease and Desist" order to prevent additional impact and implementation of mitigation to alleviate impacts. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on water resources. These measures also would assist in protecting water-dependent resources such as aquatic species and their habitat. The specific mitigation measures may include but are not limited to the following:

- Reduction or cessation in groundwater withdrawals;
- Geographic redistribution of groundwater withdrawals;
- Recharge projects to offset local groundwater drawdown;
- Flow augmentation to maintain flow in specific water sources; or
- Other on-site or off-site improvements.

Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

Although there are no designated Wild and Scenic River segments currently within the region of study, there are two river segments on USFS lands in the northern part of the region of study identified as eligible for study under the Wild and Scenic Rivers Act: Muncy Creek (wild) and Smith Creek (recreation, scenic, and wild). Muncy Creek occurs within the groundwater draw down area full build out plus 75 years. Reduced water levels in the creek over time could affect potential designation of the river segment.

Section 3.3, Water Resources, provides a detailed summary of the potentially affected springs and streams in GBNP based on the modeling completed for this EIS, as well as other recent work by the USGS. **Tables 3.14-11** and **3.14-12** provide the number of springs, and perennial stream miles that could be affected within the GBNP by 10 feet or more of groundwater drawdown.

The NPS has noted that the statute that established the GBNP specifies that the purpose of the GBNP is to conserve the natural resources within the GBNP and provide for the enjoyment of those resources in a way that leaves them unimpaired for future generations. NPS states that this mandate requires that there can be no impact to GBNP resources from the proposed project.

Conclusion. Special designations that contain water-dependent values, including phreatophytic vegetation, wet meadows, springs, and streams, could be affected by the drawdown effects from groundwater pumping. Pumping could adversely affect water-dependent values in nine special designations, with the most potential for impacts anticipated in the Baking Powder Flat, Shoshone Ponds, and Swamp Cedar ACECs. Water level changes in the Baking Powder Flat, Shoshone Ponds, and Lower Meadow Valley Wash ACECs could affect the resources being protected by the ACEC designation, compromising the objective of the designation. Potential project reductions in stream flow in springs and streams within GBNP could be contrary to the statute that established the GBNP. SNWA has recognized and agreed to "avoid any effect on federal resources within the boundaries of the GBNP from groundwater withdrawal by SNWA" (**Appendix C**). While drawdown could affect some water-dependent resources within the Pahranagat NWR and High Schells and Mount Grafton Wilderness Areas, drawdown effects would not be anticipated to compromise the objectives of these designations.

Proposed monitoring measure:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Potential residual impacts include:

- The COM Plan and water resources monitoring and mitigation measures could be effective in reducing impacts to water-dependent resources within Special Designation Areas. The objectives of the COM Plan are to avoid adverse impacts to water-dependent resources including aquatic and terrestrial species, listed species, and critical habitat. Special designations that contain water-dependent values, including phreatophytic vegetation, wet meadows, springs, and streams, could be affected by the drawdown effects from groundwater pumping These include Baking

Powder Flat ACEC, Lower Meadow Valley Wash ACEC, Pahranagat NWR, GBNP, Shoshone Ponds ACEC, Swamp Cedar ACEC, High Schells USFS Wilderness, and Mount Grafton Wilderness. It is not possible to determine the level of impact reduction at this time. Residual effects to Special Designation Areas could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to Special Designations could occur at some locations.

3.14.2.10 Alternatives A Through F

Groundwater Development Area

The same construction and facility maintenance impacts discussed for the Proposed Action would apply to Alternatives A through F. Impacts are summarized in **Table 3.14-13**.

Table 3.14-13 Summary of Impacts, Proposed Mitigation, and Residual Effects to Special Designations for Alternatives A through F

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Construction, Operation, and Maintenance					
Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No special designations would fall within the groundwater development areas.	Baking Powder flat ACEC -1,3638 acres. Swamp Cedar ACEC -3,206 acres.	Baking Powder flat ACEC -1,3638 acres. Swamp Cedar ACEC -3,206 acres.
Proposed Mitigation Measures					
GW-SD-1 (avoid new disturbance in ACESs), GW-SD-2 (additional hydrogeologic studies prior to BLM Snake Valley Lateral ROW Authorization), and ROW-SD-1 (construction area siting).			None.	GW-SD-1 (avoid new disturbance in ACESs), GW-SD-2, and ROW-SD-1 (construction area siting).	
Residual Impacts					
If future facilities are constructed within the ACEC boundaries, the associated surface disturbance and resulting facilities could diminish and possibly impair the values for which the ACEC was designated. This impact could occur in three ACECs—Baking Powder Flat, Swamp Cedar, and Baker Archeological Site ACECs.			No impacts to special designations are anticipated.	If future facilities are constructed within the ACEC boundaries, the associated surface disturbance and resulting facilities could diminish and possibly impair the values for which the ACEC was designated. This impact could occur in three ACECs—Baking Powder Flat, Swamp Cedar, and Baker Archeological Site ACECs.	

Conclusion. Surface disturbance impacts to special designations from future facilities in the groundwater development areas would be the same as the Proposed Action, with the exception of Alternative D. There are no special designations within the groundwater development areas under Alternative D.

Groundwater Pumping

Drawdown effects on special designations would be similar to the Proposed Action. Wetland meadow and phreatophytic vegetation as well as springs and perennial streams at medium to high risk for reduced flows within special designations due to pumping effects under Alternatives A though F are listed in **Table 3.14-14**, **Table 3.14-15**, and **Table 3.14-16**. Water level changes in the springs and streams in the Baking Powder Flat, Lower Meadow Valley Wash, Shoshone Ponds, and Swamp Cedar ACECs could affect the resources being protected by the ACEC designation, compromising the objective of the designation. Drawdown effects in the Pahranagat NWR could affect migratory bird habitat, but would not be anticipated to compromise the objectives of the NWR designation. Drawdown effects on springs and streams in the High Schells, Mount Grafton, Parsnip Peak (Alternative D only), and White Rock Range (Alternative D only) Wilderness Areas could affect some forms of primitive recreation dependent on the water sources, but would not be anticipated to compromise the objectives of the wilderness designation.

Conclusion. Impacts to water-dependent values within special designations from groundwater pumping would be less under all alternatives as compared to the Proposed Action, with the least impacts occurring under Alternatives C and D.

Proposed monitoring measure:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Potential residual impacts include:

- The COM Plan and water resources monitoring and mitigation measures could be effective in reducing impacts to water-dependent resources within Special Designation Areas. The objectives of the COM Plan are to avoid adverse impacts to water-dependent resources including aquatic and terrestrial species, listed species, and critical habitat. Special designations that contain water-dependent values, including phreatophytic vegetation, wet meadows, springs, and streams, could be affected by the drawdown effects from groundwater pumping These include Baking Powder Flat ACEC, Lower Meadow Valley Wash ACEC, Pahranagat NWR, GBNP, Shoshone Ponds ACEC, Swamp Cedar ACEC, High Schells USFS Wilderness, and Mount Grafton Wilderness. It is not possible to determine the level of impact reduction at this time. Residual effects to Special Designation Areas could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to Special Designations could occur at some locations.

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Table 3.14-14 Acres of Wetland Meadow and Phreatophytic Vegetation Areas within Special Designations Affected By Drawdown Due to Pumping, Alternatives A through F

Special Designation	Pumping Timeframe	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Baking Powder Flat ACEC	Full Build Out	1,475	0	1,475	0	1,475	752
	Full Build Out + 75 Years	9,546	9,350	4,394	8,262	9,546	9,546
	Full Build Out + 200 Years	9,546	9,546	6,094	9,546	9,546	9,546
Lower Meadow Valley Wash ACEC	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	78	0	0	0	0
Pahranagat NWR	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	225	0	0	0	225
Shoshone Ponds ACEC	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	1,021	1,021	505	0	1,021	1,021
	Full Build Out + 200 Years	1,021	1,021	506	861	1,021	1,021
Swamp Cedar ACEC	Full Build Out	0	1,360	0	0	0	0
	Full Build Out + 75 Years	656	3,163	12	0	656	2,767
	Full Build Out + 200 Years	2,069	3,163	72	0	1,842	3,163

Table 3.14-15 Number of Springs in Special Designations at Risk of Being Affected By Drawdown Due to Pumping, Alternatives A through F

Special Designation	Pumping Timeframe	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Baking Powder Flat ACEC	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	1	1	0	1	1	1
	Full Build Out + 200 Years	1	1	1	1	1	1
High Schells USFS Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	1	0	0	0	1
Mount Grafton Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	1	0	0	0	0
	Full Build Out + 200 Years	1	3	0	1	1	3
Parsnip Peak Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	0	0	3	0	0
Shoshone Ponds ACEC	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	5	5	3	0	5	5
	Full Build Out + 200 Years	5	5	3	5	5	5
White Rock Range Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	0	0	1	0	0

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Table 3.14-16 Miles of Perennial Streams in Special Designations at Risk of Being Affected By Drawdown Due to Pumping, Alternatives A through F

Special Designation	Pumping Timeframe	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
High Schells USFS Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0.2	0	0	0	0.02
	Full Build Out + 200 Years	0.4	0.4	0	0	0.2	0.8
Lower Meadow Valley Wash ACEC	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	3.0	0	0	0	0
Pahranagat NWR	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	0.5	0	0	0	0.5

3.14.2.11 No Action

Groundwater Development Area

Under the No Action Alternative, the ROWs would not be granted and the project would not be constructed as planned. Existing and proposed projects that would affect special management areas would be subject to BLM approval in compliance with the Ely and Las Vegas Field Office RMPs. Use and protection of special designations that are managed by other federal and state agencies would comply with those agencies' specific management plans and guidelines.

Groundwater Pumping

Under the No Action Alternative, the ROWs would not be granted and the project would not be constructed as planned. However, other ongoing projects and activities would continue to draw down groundwater levels. Projected drawdown impacts on wetland meadow and phreatophytic vegetation as well as springs and perennial streams at medium to high risk for reduced flows within special designations due to pumping effects are listed in **Table 3.14-17**, **Table 3.14-18**, and **Table 3.14-19**.

Table 3.14-17 Acres of Wetland Meadow and Phreatophytic Vegetation Areas within Special Designations Affected under No Action

Special Designation	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Lower Meadow Valley Wash ACEC	0	0	202

Table 3.14-18 Number of Springs in Special Designations at Medium to High Risk of Being Affected By Drawdown under No Action

Special Designation	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Desert NWR	0	0	2
Lower Meadow Valley Wash ACEC	0	0	3
Parsnip Peak Wilderness	0	0	7

Table 3.14-19 Miles of Perennial Streams in Special Designations at Medium to High Risk of Being Affected By Drawdown under No Action

Special Designation	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
High Schells USFS Wilderness	0	0	0
Lower Meadow Valley Wash ACEC	0	0	9
Parsnip Peak Wilderness	0	<1	1

Conclusion. Existing projects and activities under the No Action Alternative would draw down groundwater that would affect special designations that contain water-dependent values, including phreatophytic vegetation, wet meadows, springs, and streams. Areas affected include: Desert NWR, Lower Meadow Valley Wash ACEC, High Schells USFS Wilderness, and Parsnip Peak Wilderness. More details on the anticipated changes in overall plant communities and wildlife habitat are provided in Vegetation Resources, Section 3.5; Terrestrial Wildlife, Section 3.6; and Aquatic Biological Resources, Section 3.7.

3.14.3 Cumulative Impacts

3.14.3.1 Impacts Common to All Alternatives

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007). In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Special Designations

Climate change effects were not evaluated for this resource because potential effects to special designations as a result of climate change cannot be directly quantified. Sections 3.3, Water Resources; 3.5, Vegetation Resources; 3.6, Terrestrial Wildlife; and 3.7, Aquatic Biological Resources discuss the potential climate change effects on resources that many of these special designations protect.

3.14.3.2 Issues

The following issues are evaluated for cumulative impacts to special designations:

- Surface disturbance could be inconsistent with management prescriptions and diminish or impair values of special designations.
- Special designations that contain water-dependent values, including phreatophytic vegetation, wet meadows, springs, and streams, could be affected by the drawdown effects from groundwater pumping.
- Areas eligible for special designations could be adversely affected by impaired or diminished values over the long-term.

Sections 3.3, Water Resources; 3.5, Vegetation Resources; 3.6, Terrestrial Wildlife; and 3.7, Aquatic Biological Resources discuss the potential effects on resources that many of these special designations protect. A discussion of impacts to visually sensitive areas is in Section 3.15.2 and Section 3.16 discusses impacts to cultural resources.

3.14.3.3 Assumptions

The following assumptions were used in the cumulative impact analysis for special designations:

- Precautions would be taken to protect resources and important values that contribute to the special designation.
- Facilities would not be approved in special designation areas identified as ROW exclusion areas.

3.14.3.4 Methodology for Analysis

The cumulative impacts of construction of the GWD Project should take into account all surface-altering actions and actions that would drawdown groundwater that would be likely to occur and that might affect special designations in the project region that are also affected by the GWD Project. Using the impact analysis for the ROWs, groundwater development areas, and groundwater pumping, impacts from other RFFAs identified in Chapter 2 were considered.

3.14.3.5 No Action

Surface Disturbance

Under the No Action Alternative, the proposed project would not be constructed or maintained. No project-related surface disturbance would occur. However, ongoing activities and future projects would continue to occur in the region of study and may be approved on a case-by-case basis in special designations subject to approval by the federal or state administering agency. To maintain resource values within special designations, federal and state agencies would continue to manage these areas according to their specific management plans. In general, areas where surface-disturbing activity would be incompatible with the special designation, the administering agency would apply management that would exclude such activity or approve the activity with stipulations to protect resource values contributing to that designation. One exception could be within ROW corridors designated in the boundaries of special designations, where a relatively high density of utilities are sited to concentrate disturbance to existing areas. However, utilities may be forced to move outside of designated corridors and cross special designation boundaries in the future as demands increase.

Groundwater Pumping

For the No Action alternative, the ROWs would not be granted and the project would not be constructed as planned. However, other planned projects and activities would occur that would drawdown groundwater levels. Cumulative drawdown impacts to wetland meadow and phreatophytic vegetation as well as springs and perennial streams at medium to high risk for reduced flows within special designations due to pumping effects under the No Action Alternative are listed in **Tables 3.14-20**, **3.14-21**, and **3.14-22**.

Table 3.14-20 Acres of Wetland Meadow and Phreatophytic Vegetation Areas within Special Designations Affected By Drawdown Due to Cumulative Pumping with No Action

Special Designation	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Clover Mountains Wilderness	0	0	1
Lower Meadow Valley Wash ACEC	202	263	446
Mormon Mesa ACEC	0	0	37
Pahranagat NWR	225	225	225

Table 3.14-21 Number of Springs in Special Designations at Risk of Being Affected By Drawdown Due to Cumulative Pumping with No Action

Special Designation	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Becky Peak Wilderness	0	1	1
Desert NWR	0	1	5
Lower Meadow Valley Wash ACEC	3	4	4
Mormon Mesa ACEC	0	0	2
Pahranagat NWR	0	0	1
Parsnip Peak Wilderness	0	0	7

Table 3.14-22 Miles of Perennial Streams in Special Designations at Risk of Being Affected By Drawdown Due to Cumulative Pumping with No Action

Special Designation	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Clover Mountains Wilderness	0	0	<1
Condor Canyon ACEC	0	0	<1
Lower Meadow Valley Wash ACEC	9	9	22
Pahranagat NWR	<1	<1	<1
Parsnip Peak Wilderness	0	<1	1

Conclusion. Under the No Action Alternative, the proposed project would not be constructed or maintained. However, ongoing activities and future projects would continue to occur in the region of study and may be approved on a case-by-case basis in special designations subject to approval by the federal or state administering agency. Existing projects and activities under the No Action Alternative would drawdown groundwater and affect special designations that contain water-dependent values, including phreatophytic vegetation, wet meadows, springs, and streams. Areas affected include: three ACECs (Condor Canyon, Lower Meadow Valley Wash, and Mormon Mesa ACECs), two NWRs (Desert and Pahranagat NWRs), and three wilderness areas (Becky Peak, Clover Mountains, and Parsnip Peak Wilderness). More details on the anticipated changes in overall plant communities and wildlife habitat are provided in Vegetation, Section 3.5; Terrestrial Wildlife, Section 3.6; and Aquatic Biological Resources, Section 3.7.

3.14.3.6 Proposed Action

Groundwater Development Area

The GWD Project would contribute to cumulative effects in special designations where other RFFAs would disturb the same special designation. Surface disturbance associated with the GWD Project is anticipated in five ACECs (Baker Archeological Site, Baking Powder Flat, Coyote Springs, Kane Springs, and Swamp Cedar ACECs). The ACECs are managed as ROW avoidance areas, but ROWs might be granted if minimal conflict existed with the identified resource values and if impacts could be mitigated (BLM 2008). Although placing facilities within avoidance areas is not prohibited in these areas, the construction and operation of the facilities might affect the resources and important values within them. The Spring Valley Wind Project would disturb an area adjacent to the Swamp Cedar ACEC. The TransWest Express, Zephyr, ON Transmission Line and Eastern Nevada Transmission Line projects would pass through the Coyote Springs ACEC and disturb area adjacent to the Kane Springs ACEC. The GWD Project would contribute to cumulative impacts to these three ACECs.

To maintain resource values within special designations, federal and state agencies would continue to manage these areas according to their specific management plans. In general, areas where surface-disturbing activity would be incompatible with the special designation, the administering agency would apply management that would exclude such activity or approve the activity with stipulations to protect resources values contributing to that designation. One exception could be within ROW corridors designated in the boundaries of special designations, where a relatively high density of utilities are sited to concentrate disturbance to existing areas. However, utilities may be forced to move outside of designated corridors and cross special designation boundaries in the future as demands increase.

Groundwater Pumping

Cumulative drawdown impacts to wetland meadow and phreatophytic vegetation as well as springs and perennial streams at medium to high risk for reduced flows within special designations due to pumping effects under the Proposed Action Alternative are listed in **Tables 3.14-23**, **3.14-24**, and **3.14-25**.

Table 3.14-23 Acres of Wetland Meadow and Phreatophytic Vegetation Areas within Special Designations Affected By Drawdown for No Action, Cumulative, Proposed Action and Cumulative with Proposed Action[1]

Special Designation	Cumulative with No Action			Proposed Action			Cumulative with Proposed Action		
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200Years
Clover Mountains Wilderness	0	0	1	0	0	0	0	0	1
Lower Meadow Valley Wash ACEC	202	263	446	0	0	78	202	341	492
Mormon Mesa ACEC	0	0	37	0	0	0	0	0	37
Pahranagat NWR	225	225	225	0	0	225	225	225	247
Baking Powder Flat ACEC	0	0	0	1,475	9,546	9,546	1,475	9,546	9,546
Shoshone Ponds ACEC	0	0	0	0	1,021	1,021	506	1,021	1,021
Swamp Cedar ACEC	0	0	0	93	3,163	3,163	210	3,163	3,163

[1] Acreages are based on drawdown models outputs and are not additive. Information presented is approximate and intended to display incremental effects of the project in relation to other projects in the region.

Table 3.14-24 Number of Springs in Special Designations at Risk Due to Groundwater Pumping for No Action Cumulative, Proposed Action, and Cumulative with Proposed Action[1]

Special Designation	Cumulative with No Action			Proposed Action			Cumulative with Proposed Action		
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200Years
Becky Peak Wilderness	0	1	1	0	0	0	0	1	2
Desert NWR	0	1	5	0	0	0	0	1	5
Lower Meadow Valley Wash	3	4	4	0	0	0	3	4	4
Mormon Mesa ACEC	0	0	2	0	0	0	0	0	2
Pahranagat NWR	0	0	1	0	0	0	0	1	1
Parsnip Peak Wilderness	0	0	7	0	0	0	0	0	7
Baking Powder Flat ACEC	0	0	0	0	1	1	0	1	1
High Schells USFS Wilderness	0	0	0	0	0	1	0	0	1
Mount Grafton Wilderness	0	0	0	0	0	3	0	0	3
Shoshone Ponds ACEC	0	0	0	0	5	5	3	5	5

[1] Acreages are based on drawdown models outputs and are not additive. Information presented is approximate and intended to display incremental effects of the project in relation to other projects in the region.

Table 3.14-25 Miles of Perennial Streams in Special Designations at Risk Due to Groundwater Pumping for No Action Cumulative, Proposed Action, and Cumulative with Proposed Action[1]

	Cumulative with No Action			Proposed Action			Cumulative with Proposed Action		
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200Years
Clover Mountains Wilderness	0	0	<1	0	0	0	0	0	<1
Condor Canyon ACEC	0	0	<1	0	0	0	0	0	<1
Lower Meadow Valley Wash	9	9	22	0	0	3	9	13	25
Pahranagat NWR	<1	<1	<1	0	0	<1	<1	<1	<1
Parsnip Peak Wilderness	0	<1	1	0	0	0	0	<1	1
High Schells USFS Wilderness	0	0	0	0	<1	1	0	<1	1
Mount Grafton Wilderness	0	0	0	0	0	0	0	0	<1

[1] Acreages are based on drawdown models outputs and are not additive. Information presented is approximate and intended to display incremental effects of the project in relation to other projects in the region.

The Proposed Action would contribute incremental effects under cumulative pumping to spring, stream, wet meadow, and phreatophytic vegetation within special designations: Lower Meadow Valley Wash ACEC, Pahranagat NWR, Baking Powder Flat ACEC, Shoshone Ponds ACEC, Swamp Cedar ACEC, High Schells USFS Wilderness, and Mount Grafton Wilderness (**Tables 3.14-23** through **3.14-25**). The Proposed Action would contribute all of the predicted effects on special designations impact parameters in Baking Powder Flat ACEC, Shoshone Ponds ACEC, Swamp Cedars ACEC, High Schells USFS Wilderness, and Mount Grafton Wilderness. The magnitude of the contribution would be highest in Baking Powder Flat ACEC, Shoshone Ponds ACEC, and Swamp Cedars ACEC, as indicated by vegetation and spring effects in **Tables 3.14-23** and **3.14-24**. The contribution is relatively small in the other special designations. The Proposed Action would contribute a small portion of effects in combination with No Action pumping in Lower Meadow Valley Wash ACEC and Pahranagat NWR. No Action pumping contributes all of the effects on special designations in Pahranagat NWR. No Action pumping contributes all of the effects on special designations in Becky Peak Wilderness, Clover Mountains Wilderness, Desert NWR, Parsnip Peak Wilderness, Condor Canyon ACEC, and Mormon Mesa ACEC.

Conclusion. Special designations that contain water-dependent values, including phreatophytic vegetation, wet meadows, springs, and streams, could be adversely affected by cumulative drawdown effects from groundwater pumping. Proposed Action pumping would contribute adverse incremental effects to wetland meadow and phreatophytic vegetation in four ACECs (Baking Powder Flat, Lower Meadow Valley Wash, Shoshone Ponds, and Swamp Cedar ACECs), which could compromise the objective of the designation. While Proposed Action pumping would contribute adverse effects to some water-dependent resources within one wildlife refuge (Pahranagat NWR) and two wilderness areas (High Schells and Mount Grafton), drawdown effects would not be anticipated to compromise the objectives of these designations.

3.14.3.7 Alternatives A through F

Groundwater Development Area

Cumulative impacts to special designations from surface disturbance associated with the GWD Project and other RFFAs would be similar to the Proposed Action, with the exception of Alternative D. There are no special designations within the groundwater development areas under Alternative D.

Groundwater Pumping

Cumulative drawdown effects on special designations would be similar to the Proposed Action. Wetland meadow and phreatophytic vegetation as well as springs and perennial streams at moderate or high risk for reduced flows within special designations would result from cumulative pumping under Alternatives A though F (**Tables 3.14-26**, **3.14-27**, and **3.14-28**).

The patterns of incremental contributions from Alternatives A through F would be the same as the Proposed Action. Individual alternatives would contribute all of the adverse effects on special designations in Baking Powder Flat ACEC, Shoshone Ponds ACEC, Swamp Cedars ACEC, High Schells USFS Wilderness, and Mount Grafton Wilderness. Alternative D pumping would contribute all of the effects on special designation parameters in White Rock Range Wilderness. Individual alternatives would contribute a small portion of effects on special designations in combination with No Action pumping in Lower Meadow Valley Wash ACEC and Pahranagat NWR. All of the alternatives (A through F) would result in a lesser extent of drawdown impacts to special designations, as compared to the Proposed Action.

Table 3.14-26 Acres of Wetland Meadow and Phreatophytic Vegetation Areas within Special Designations Affected By Drawdown Due to Cumulative Pumping (Alternatives A through F)

Special Designation	Pumping Timeframe	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Baking Powder Flat ACEC	Full Build Out	1,561	0	1,561	0	1,561	1,561
	Full Build Out + 75 Years	9,546	9,392	4,416	8,681	9,546	9,546
	Full Build Out + 200 Years	9,546	9,546	6,589	9,546	9,546	9,546
Clover Mountain Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	1	1	1	1	1	1
Lower Meadow Valley Wash ACEC	Full Build Out	202	202	202	202	202	202
	Full Build Out + 75 Years	263	341	263	263	263	341
	Full Build Out + 200 Years	446	492	446	446	446	460
Mormon Mesa ACEC	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	37	37	337	37	37	37
Pahranagat NWR	Full Build Out	225	225	225	225	225	225
	Full Build Out + 75 Years	225	225	225	225	225	225
	Full Build Out + 200 Years	225	247	225	225	225	225
Shoshone Ponds ACEC	Full Build Out	262	506	262	0	262	262
	Full Build Out + 75 Years	1,021	1,021	767	208	1,021	1,021
	Full Build Out + 200 Years	1,021	1,021	923	923	1,021	1,021
Swamp Cedar ACEC	Full Build Out	0	1,394	0	0	0	0
	Full Build Out + 75 Years	689	3,163	72	0	689	2,767
	Full Build Out + 200 Years	2,118	3,163	72	0	1,871	3,163

Table 3.14-27 Number of Springs in Special Designations at Risk of Being Affected By Drawdown Due to Cumulative Pumping (Alternatives A through F)

Special Designation	Pumping Timeframe	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Baking Powder Flat ACEC	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	1	1	0	1	1	1
	Full Build Out + 200 Years	1	1	1	1	1	1
Becky Peak Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	1	1	1	1	1	1
	Full Build Out + 200 Years	1	1	1	1	1	2
Desert NWR	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	1	1	1	1	1	1
	Full Build Out + 200 Years	5	5	5	5	5	5
High Sehells USFS Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	1	0	0	0	1
Lower Meadow Valley Wash ACEC	Full Build Out	3	3	3	3	3	3
	Full Build Out + 75 Years	4	4	4	3	4	4
	Full Build Out + 200 Years	4	4	4	4	4	4
Mormon Mesa ACEC	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	2	2	2	2	2	2
Mount Grafton Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	1	0	0	0	0
	Full Build Out + 200 Years	2	3	1	2	2	3
Pahranagat NWR	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	1	0	0	0	0
	Full Build Out + 200 Years	1	1	1	1	1	1
Parsnip Peak Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	7	7	7	7	7	7
Shoshone Ponds ACEC	Full Build Out	3	3	3	0	3	3
	Full Build Out + 75 Years	5	5	5	3	5	5
	Full Build Out + 200 Years	5	5	5	5	5	5
White Rock Range Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	0	0	3	0	0

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Table 3.14-28 Miles of Perennial Streams in Special Designations at Risk of Being Affected By Drawdown Due to Cumulative Pumping (Alternatives A through F)

Special Designation	Pumping Timeframe	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Clover Mountains Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0.2	0.2	0.2	0.2	0.2	0.2
Condor Canyon ACEC	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	<1	<1	<1	<1	<1	0.5
High Schells USFS Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	<1	<1	0	0	<1	0.6
	Full Build Out + 200 Years	<1	<1	<1	0	<1	1
Lower Meadow Valley Wash ACEC	Full Build Out	9	9	9	9	9	9
	Full Build Out + 75 Years	12	13	12	9	12	13
	Full Build Out + 200 Years	22	25	22	22	22	23
Mount Grafton Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	0	0	0	0	0	0
	Full Build Out + 200 Years	0	<1	0	0	0	0
Pahranagat MWR	Full Build Out	<1	<1	<1	<1	<1	0.5
	Full Build Out + 75 Years	<1	<1	<1	<1	<1	0.5
	Full Build Out + 200 Years	<1	<1	<1	<1	<1	0.5
Parsnip Peak Wilderness	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	<1	<1	<1	<1	<1	0.3
	Full Build Out + 200 Years	1	1	1	1	1	1.3
GBNP	Full Build Out	0	0	0	0	0	0
	Full Build Out + 75 Years	6	13	4	0	0	0
	Full Build Out + 200 Years	9	15	8	8	8	8

3.15 Visual Resources

3.15.1 Affected Environment

3.15.1.1 Overview

The study area for visual resources includes the proposed ROWs and groundwater development areas, and an additional 15 miles on all sides of aboveground facilities or to the horizon (**Figures 3.15-1** and **3.15-2**). This is the BLM background zone (15 miles) for visual resources analysis (BLM 1986a). In addition, the visual resources study area includes areas with phreatophytic (primarily shrubs and herbaceous species) and wetland/meadow vegetation (see Sections 3.5, Vegetation Resources; and **Figures 3.5-1, 3.5-2, 3.5-3** and **3.5-4**) associated with the region of study for vegetation types that may be affected by potential groundwater drawdown effects.

Public lands surrounding the proposed ROWs and groundwater development areas consist primarily of BLM-administered lands, although a short portion of Option 1 (Humboldt-Toiyabe Power Line Alignment) would cross USFS-administered lands. Management direction for maintaining the quality of scenic and visual resources is contained in the BLM RMPs and USFS Forest Plans governing the facilities' location and described in terms of the BLM Visual Resource Management (VRM) System and the USFS Scenery Management System. The VRM is based in part on the VRI, which identifies the baseline visual resources of an area.

QUICK REFERENCE

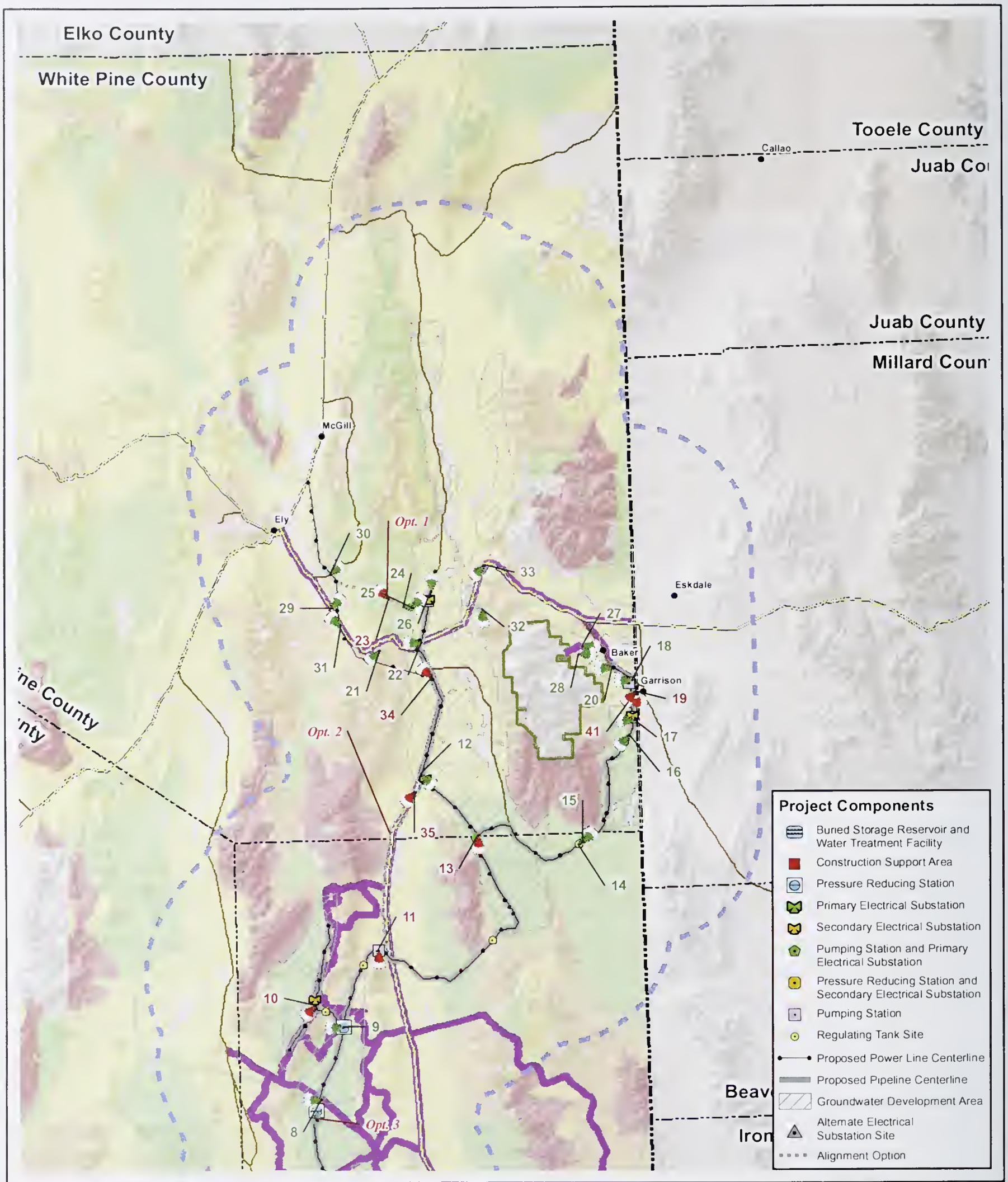
GBNP – Great Basin National Park
KOP – Key Observation Point
NPS – National Park Service
OHV – Off-highway Vehicle
SR – State Route
USFS – U.S. Forest Service
VQO – Visual Quality Objectives
VRI – Visual Resource Inventory
VRM – Visual Resource Management

Land Use Plans

- Las Vegas RMP – The Las Vegas Field Office VRM classes, or objectives, for portions of Clark and adjacent Lincoln counties are illustrated on **Figures 3.15-1** and **3.15-2** (BLM 1998). A Visual Resource Inventory (VRI) was completed in March 2011 and VRI classes are illustrated in **Figures 3.15-3** and **3.15-4**.
- Ely District RMP – The Ely VRM classes, or objectives, are illustrated on **Figures 3.15-1** and **3.15-2** (BLM 2008). A VRI was completed in September 2011; and VRI classes are illustrated in **Figures 3.15-3** and **3.15-4**.
- Humboldt-Toiyabe National Forest Land and RMP – The Humboldt-Toiyabe National Forest Land and RMP contains visual quality objectives (VQO) for lands that would be crossed by Alignment Option 1 (Humboldt-Toiyabe Power Line Alignment).

Visual Resource Management

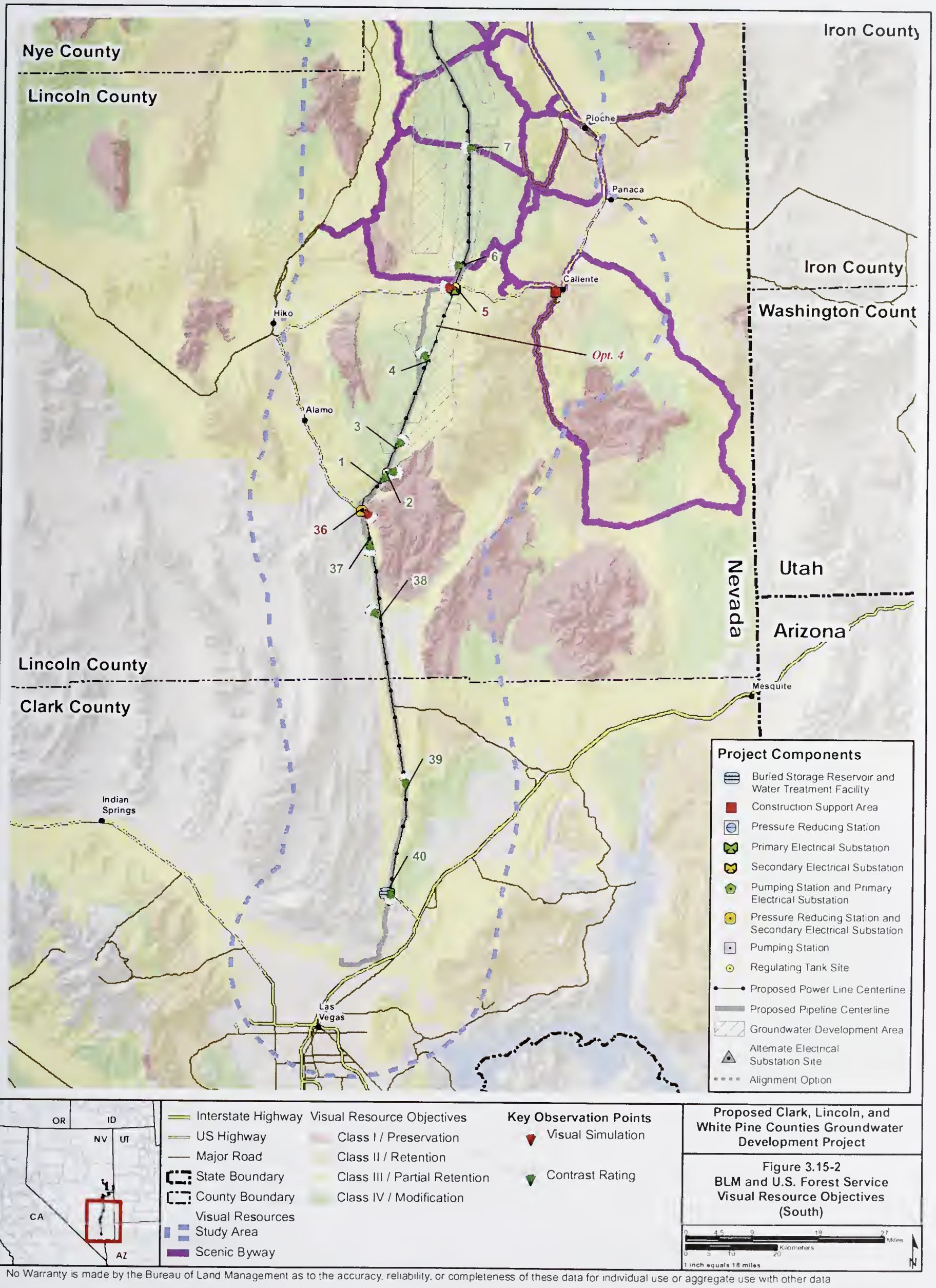
VRI for the Southern Nevada and Ely District in Nevada and the Fillmore Field Office in Utah provide a baseline scenic quality evaluation, a delineation of distance zones, and a sensitivity level analysis. Based on these three factors, BLM-administered lands are placed into one of four VRI classes that represent the relative value of the visual resources. Classes I and II are the most valued, Class III represents a moderate value, and Class IV is of lesser value. Inventory classes are informational in nature and provide the basis for considering visual values in the development of VRM classes. A summary of the available VRI for the Southern Nevada and Ely Districts can be found in **Appendix F3.15**.



Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.15-1
BLM and U.S. Forest Service Visual Resource Objectives (North)

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

Elko County
White Pine County
Tooele County
Callao
Juab Co
Juab County
Millard Coun
McGill
Ely
Opt. 1
Opt. 2
Opt. 3
Eskdale
Baker
Garrison
Beav
Iron
ne County
nty
30
24
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Project Components

- Buried Storage Reservoir and Water Treatment Facility
- Construction Support Area
- Pressure Reducing Station
- Primary Electrical Substation
- Secondary Electrical Substation
- Pumping Station and Primary Electrical Substation
- Pressure Reducing Station and Secondary Electrical Substation
- Pumping Station
- Regulating Tank Site
- Proposed Power Line Centerline
- Proposed Pipeline Centerline
- Groundwater Development Area
- Alternate Electrical Substation Site
- Alignment Option

OR ID NV UT CA AZ

- Interstate Highway
- US Highway
- Major Road
- State Boundary
- County Boundary
- Visual Resources Study Area
- BLM Wilderness (VRI Class I)
- Great Basin National Park

VRI Class
- VRI Class I
- VRI Class II
- VRI Class III
- VRI Class IV

Key Observation Points
- Visual Simulation
- Contrast Rating

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.15-3
BLM Visual Resource Inventory (North)

0 4.5 9 18 27 Miles
0 5 10 20 Kilometers
1 inch equals 18 miles
N

No Warranty is made by the Bureau of Land Management as to the accuracy reliability, or completeness of these data for individual use or aggregate use with other data

Nye County
Lincoln County
Iron County
Iron County
Washington Count
Utah
Nevada
Arizona
Lincoln County
Clark County
Pioche
Panaca
Caliente
Hiko
Alamo
Indian Springs
Las Vegas
Mesquite
Opt. 4
1
2
3
4
5
6
7
36
37
38
39
40

Project Components

- Buried Storage Reservoir and Water Treatment Facility
- Construction Support Area
- Pressure Reducing Station
- Primary Electrical Substation
- Secondary Electrical Substation
- Pumping Station and Primary Electrical Substation
- Pressure Reducing Station and Secondary Electrical Substation
- Pumping Station
- Regulating Tank Site
- Proposed Power Line Centerline
- Proposed Pipeline Centerline
- Groundwater Development Area
- Alternate Electrical Substation Site
- Alignment Option

OR ID NV UT CA AZ

- Interstate Highway
- US Highway
- Major Road
- State Boundary
- County Boundary
- Visual Resources Study Area
- BLM Wilderness (VRI Class I)

VRI Class

- VRI Class I
- VRI Class II
- VRI Class III
- VRI Class IV

Key Observation Points

- Visual Simulation
- Contrast Rating

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.15-4
BLM Visual Resource Inventory (South)

0 4.5 9 18 27 Miles
0 5 10 20 Kilometers
1 inch equals 18 miles
N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

The BLM and USFS visual resource objectives define the amount of disturbance an area can absorb before it no longer meets the objective for that area. The BLM VRM classes are assigned to the various landscapes in each of the BLM's resource areas. The VRM classes range from I to IV, with Class I being the most restrictive and IV being the least restrictive in terms of modifications to the quality of the resources. The objectives of the BLM VRM classes are described as follows:

Class I – To preserve the existing character of the landscape. The level of change to the characteristic landscape should be low and must not attract attention.

Class II – To retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III – To partially retain the existing character of the landscape. The level of change to the characteristic landscape should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV – To provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

BLM Visual Resource Management Classes

Class I – to preserve the existing character of the landscape.

Class II – to retain the existing character of the landscape. Changes should repeat elements in predominant natural features.

Class III – To partially retain the existing character of the landscape. Changes should not dominate the landscape.

Class IV – To provide for management activities that require major modification of the existing character of the landscape. The level of change can be high.

The BLM visual resource objectives are not a reflection of scenic quality. Instead, they are management direction that may allow high levels of change on highly scenic lands if those lands are managed to less restrictive visual resource objectives.

Several segments of the proposed project have been co-located in the SWIP and LCCRDA utility corridors, which have been designated VRM Class IV.

To manage scenic resources on public lands, the Humboldt-Toiyabe National Forest uses a system similar to the BLM with VQOs as management guidelines, with Preservation being the most restrictive and Maximum Modification being the least restrictive as shown in **Table 3.15-1**. The Alignment Option 1 route (Humboldt-Toiyabe Power Line Alignment) from Ely to Spring Valley follows a designated utility corridor adjacent to existing power lines in the Humboldt-Toiyabe National Forest. This designated utility corridor has visual resource objectives of partial retention, modification and maximum modification.

Table 3.15-1 Comparison of United States Forest Service Visual Quality Objectives and Bureau of Land Management Visual Resource Management Classes

USFS VQO Classes	BLM VRM Classes
Preservation	Class I
Retention	Class II[1]
Partial Retention[1]	Class II and III[1]
Modification[1]	Class IV[1]
Maximum Modification[1]	Not comparable to BLM classification. Maximum Modification allows activities that may not appear to completely borrow from naturally established form, line, color, texture, or scale (USFS 1974).

[1] Management objectives of public lands crossed by alternative corridors.

NPS visual quality objectives apply to NPS-managed lands. These lands are not directly affected by the proposed project. NPS management guidance contained in the enabling GBNP legislation, general management plan, and other documents regarding the preservation of scenic values, viewsheds, and night sky conditions for the GBNP propose aspirations for lands outside of GBNP. The enabling legislation established the GBNP based in part on its "outstanding resources and significant geological and scenic values" (NPS 1986). Prior to its establishment as a national park, the area was managed by the USFS as the Wheeler Peak Scenic Area. The Great Basin National Park Management Plan explains that "views across Snake Valley and Spring Valley as visitors approach the park and from various locations within the park greatly enhance experiences and are a significant park resource." The Plan further states the planning objective to "minimize the adverse visual impacts of human activity on the Snake and Spring valleys" (NPS 1992). As described in *The Guide to Managing the National Park System* (NPS 2006), NPS management directive is to protect natural darkness and other components of the natural landscape in parks. As a result, NPS minimizes the light emanating from park facilities and seeks cooperation of park visitors, neighbors, and local government agencies to prevent or minimize changes to the pastoral basin scenes visible from the Park.

Special Management Areas and Sites

Four Nevada state-designated byways traverse portions of the ROW and groundwater development areas (NDOT 2009). No management plans for these scenic byways are included on the list of completed projects posted on the NDOT website.

- Baker Road (SR 487). Designated by the Director of the Department of Transportation on March 27, 2000. Location – Begins at the junction of U.S. 50/6 and ends at Nevada/Utah state line (Distance = 11.6 miles).
- U.S. 50/6/93. Designated by the Director of the Department of Transportation on March 27, 2000. Location – Begins at the access road to the 3C Ranch (just south of Ely) and ends at the Nevada/Utah State line (Distance = 63 miles).
- U.S. 93 (Nevada's first Scenic Byway). Location – Begins at the junction with SR 318 and ends at Majors Junction (U.S. 6/50) (Distance = 148.8 miles).
- Lehman Caves Road (SR 488). Designated by the Director of the Department of Transportation on March 27, 2000. Location – Begins at the junction of SR 487 and ends at the GBNP gate (Distance = 5.4 miles).

Other Special Management Areas include:

- Mount Wilson Scenic Byway – a BLM-designated byway looping from Pony Springs at U.S. 93 to Pioche at U.S. 93. This byway lies beyond the middle ground (4 miles) of the GWD Project.
- The Silver State Off-Highway Vehicle (OHV) Trail – a congressionally designated OHV trail system in Lincoln County that is crossed by the project as it runs near Pioche, Caliente, and Alamo.
- The Rainbow Canyon BLM Backcountry Byway — a BLM-designated byway looping near Caliente through Kershaw-Ryan State Park past the Caliente Construction Support Area.

In the BLM VRM mapping process, no distinction is made between foreground and middle-ground distances. However, in this document, 'foreground' is used to refer to viewing distances under 0.5-mile; 'middle-ground' to distances between 0.5 and 4 miles, and 'background' to distances over 4 miles.

The Great Basin National Heritage Area encompasses White Pine County, Nevada and Millard County, Utah and adjacent Indian reservations, and contains nationally significant archaeological, historical, cultural, natural, and scenic features that characterize the Great Basin Area. The Great Basin National Heritage Route in the study area includes scenic western landscapes and nationally significant features that include museums and historic and interpretive sites along U.S. 50 and U.S. 93 in White Pine County. The heritage area and route designation confer no authority to manage or regulate land use (Great Basin Heritage Area Partnership 2011).

3.15.1.2 Rights-of-way and Groundwater Development Areas

Visual resourees within the GWD Projeet study area are influeneed by a wide variety of eharaeteristies (e.g., topography, geology, vegetation, hydrology). Mueh of the visual experienee in the analysis area is dominated by the arid Great Basin landseape, as shown in **Figure 3.15-5**. The regional landseape is part of the Great Basin seetion of Fenneman's Basin and Range physiographie provinee, a vast desert area of the western U.S. extending from eastern Oregon to western Texas eharaeterized by periodie mountain ranges separated by desert plain (Fenneman 1931). The basin topography of eentral Nevada is notable for a level playa (dry lakebed or stream eourse) enelosed by steeply rising, barren alluvial fans, and bajadas (shallow slopes that lie at the base of roeky hills, where materials aeeumulate from the weathering of the roeks) and relatively high ridges in nearly every direetion. The mountain ranges rise on both sides of the valleys and provide a seenie baekdrop as viewed from U.S. 93, 50, and 6/50 and state highways (UT487, NV893, and NV894).

The study area eontains minor human modifieations north of Apex in the form of state highways, rural eommunities, and ranehing aetivities evideneed by the presenee of fenees and dirt roads. The ON Line Transmission Projeet eonsisting of an approximately 235-mile long 500 kV transmission line from the new Robinson Summit Substation in White Pine County to the existing Harry Allen Substation in Clark County (BLM 2010) is eurrently under eonstruetion and eonsidered as a foreseeable projeet in the Final EIS. The transmission line will be eomprised of 100 to 185 feet tall single-eireuit steel H-frame and lattiee towers. The projeet generally falls within the designated SWIP Utility Corridor, whieh is managed as VRM Class IV.

The ROWs for the Proposed Aetion and alternatives eross 13 valley floors extending from Las Vegas Valley on the south to Spring and Snake valleys in the northern portion of the study area (**Figure 3.0-1**). The proposed pipeline ROWs lie in the valley floors and parallel existing power lines and railroads in eertain areas, while the power transmission lines traverse valley floors and eross mountain ranges.

Scenic Quality

Seenie quality is the measure of the visual appeal of a traet of land. The key faetors in a landseape that affeet existing seenie quality are landform, vegetation, water, eolor, influenee of adjaeent seenery, seareity, and eultural modifieation (BLM 1986b). A summary of the VRI seenie quality rating units affeeted by the proposed projeet ean be found in **Table F3.15-1**.

Scenic Quality is often described as the overall impression retained after travelling through an area of land and is affected by factors such as landform, vegetation, water and color.

In the northern Great Basin portion of the projeet area, vegetation patterns are eomprised of pinyon-juniper forests in the higher elevations with sagebrush and grasses in the valley floors. Pinyon-juniper eommunities are effeetive in screening some surfaee disturbanees. Mojave Desert vegetation and Joshua trees add to the seenie quality of the southern projeet area. The proposed projeet erosses steep washes and arroyos, sueh as Big Springs Wash, and seenie areas sueh as Cave Valley, Conner Pass, the BLM lands east of GBNP, and some groundwater development areas are adjaeent to designated wilderness areas and GBNP.

Distance Zones and Visibility

Landseapes are subdivided into 3 distanee zones based on relative visibility from travel routes or observation points. Distanee zones are delineated as part of a VRI, beeause it provides valuable information that is useful in the sensitivity analysis (see below). Foreground-middle-ground zones (the area that ean be seen from an observation point for a distanee of 3 to 5 miles) are more visible to the publie and ehanges are more notieeable and are more likely to trigger publie eoneern.

In the BLM VRM mapping proeess, no distinetion is made between foreground and middle-ground distanees. However, in this doeument, 'foreground' is used to refer to viewing distanees under 0.5-mile; 'middle-ground' to distanees between 0.5 and 4 miles, and 'baekground' to distanees over 4 miles.

View from Wheeler Peak in GBNP looking toward Spring Valley (BLM 2010).

Key Observation Point (KOP) 28 located near Lehman Caves Road (SR 488) outside of the GBNP looking toward Snake Valley and the town of Baker.

Figure 3.15-5 Typical Views of the Basin and Range Physiographic Province with Sagebrush Covered Dry Valleys Enclosed by Alluvial Fans and High Ridges with Pinyon-Juniper Forests

High visibility is a defining characteristic of the region's landscape character. Generally, the vast, open nature of the analysis area provides for wide and distant vistas due to the large open areas of level topography and absence of intervening landscape features, especially from high elevations. According to the National Parks Conservation Association, the GBNP enjoys exceptional air quality allowing viewers to "see more than 186 miles, and occasionally views exceed 230 miles. Peaks in the GBNP enjoy expansive views of Spring and Snake valleys" (National Parks Conservation Association [NPCA] 2009). Wheeler Peak is designated as a Critical Viewing Area in the GBNP General Management Plan, and all exceptional resources associated with the Snake and Spring valley basins are considered critical to the visitor experience (NPS 1992).

The horizon is a significant aspect of all distant views, and the enclosed viewshed generally equates to a hydrologic basin. Field observations found that individual skylined features such as a communication or transmission tower can generally be discerned when extended above the horizon (i.e., skylined) up to 4 miles, when atmospheric conditions permit. Structures below the horizon line typically are not readily discernable up to 3 miles, as they blend with the forms, lines, colors, or textures of the background. The patterns (lines and forms) resulting from large-scale infrastructure projects features contrast with natural features and also can be distinguished by the human eye to the background distance zone (15 miles). When viewed from above, such as from mountain peaks, changes to valley floors appear more prominently than when the same change is viewed from the valley floors.

As a result, maintenance of visual resources is a concern from nearby and distant viewing locations, including views from federal lands with high visual resource values, federally designated recreation areas, GBNP, major transportation routes, and population centers such as Baker, Ely, and Las Vegas. Proposed facilities would be located within the foreground and middleground distance zone of areas identified as sensitive, including known travel routes, areas of human habitation, areas of traditional use for recreational areas, and special management areas (**Figures 3.9-1**, **3.14-1** and **3.14-2**).

High visibility and isolation from metropolitan areas provides exceptional opportunities for stargazing in the northern portion of the study area. GBNP contains some of the most pristine night sky views in the continental U.S. and one of the best opportunities for stargazing in the National Park System. Existing local light sources in the study area include the towns of Ely, Pioche, Panaca, Caliente, Hiko, Alamo, Lund, and Baker, Nevada. Regional night sky pollution sources include regional haze, airborne dust particles, and the metropolitan areas of Salt Lake City, Provo, St. George, and Cedar City, Utah and Las Vegas, Nevada (NPCA 2009). Nighttime ambient light levels vary depending on the age, condition, and general abundance of lighting sources present within a particular viewshed. Skyglow increases with proximity to the Las Vegas metropolitan area.

Sensitivity Levels

Sensitivity levels are the measure of public concern for scenic quality. Each viewer brings perceptions formed by individual influences: culture, visual training, familiarity with local geography, and personal values. User sensitivity levels are determined by considering use volume and user attitude at each observation point (BLM 1986a,b). A summary of the VRI sensitivity level rating units affected by the proposed project can be found in **Table F3.15-1**.

Use volume refers to the frequency of travel through an area (by road, trail, or river). Protection of visual values generally becomes more important as the number and frequency of viewers increase. The major travelways in the study area include federal and state highways including the four Nevada state-designated byways described above and shown on **Figure 3.15-1** and **3.15-2**. The Silver State Trail is also a popular, non-paved OHV system that traverses the project. Travelers make a deliberate routing choice based on the historical, cultural, and other attractions of scenic byways, as described in Sections 3.18, Socioeconomics and Environmental Justice and 3.9, Recreation. Recreational travel patterns are highly dependent on these highways, the existing local road network, and gated access points.

User attitude is a measure of public concern for scenic quality. User attitude is dependent on factors such as the type of users, public interest, and adjacent land uses. Recreational users, especially those who are attracted to an area by its scenic quality and intact landscape character, tend to be highly sensitive to changes in visual quality. As described in Sections 3.18, Socioeconomics and Environmental Justice and 3.9, Recreation, the most popular recreational uses include OHV use, hunting and fishing, wildlife watching, hiking, and camping. Stargazing also is a popular activity: almost half of all visitors to the GBNP considered dark skies as an important or very important consideration in making their travel plans to go to GBNP (NPS 2007). Designated parks, wilderness areas, the Great Basin National Heritage

Route, wildlife refuges and conservation areas on BLM, USFS, NPS, and state lands are regional destinations (**Figures 3.9-1**, **3.14-1** and **3.14-2**). Lands visible from but outside of designated special areas contribute to the quality of the recreational experience. For example, unobstructed views in Spring and Snake valleys are cited as extremely important to the visitor's experience at GBNP (NPS 1992). Visitation fluctuates seasonally and with holidays, with most tourism activity occurring within the 4-month period of June through September.

User attitude also is dependent on the level of public interest associated with the project and is affected by adjacent land uses. As only small portions of the study area are developed, with approximately 96 percent managed by the BLM and relatively large portions designated as special management areas with a remote character, users typically are more sensitive to visual change in the study area.

Potentially sensitive areas for visual resources within 4 miles from proposed project facilities (ROWs, groundwater development areas) include wilderness areas, GBNP, scenic byways, and recreation use areas. Several organized recreation areas (e.g., day use areas, campgrounds) are within 4 miles of the transmission lines as described in Section 3.15.2, Environmental Consequences.

3.15.1.3 Region of Study

Delineation of the visual resources area of study is described above (3.15.1.1, Overview), and depicted on **Figures 3.15-1** and **3.15-2**. Groundwater-dependent vegetation on the valley floor and riparian vegetation along perennial streams, seeps, and springs are scarce and generally attract attention in arid regions. As discussed in Sections 3.3, Water Resources and 3.5, Vegetation Resources, most of the surface water features and associated vegetation occur in the Spring, Snake, Steptoe, and White River valleys. Basin shrubland vegetation cover within the region of study is shown in **Figures 3.5-3** and **3.5-4**, Vegetation Resources.

3.15.2 Environmental Consequences

3.15.2.1 Rights-of-way

Issues

GWD Project construction and facility maintenance would result in a permanently changed visual setting in visible portions of the study area. The following visual resource issues were evaluated as part of the impact analysis for construction and facility maintenance within the primary pipeline and power line ROWs:

- Short-term and long-term visual resource changes resulting from aboveground facilities, power lines, project surface disturbance, and construction-generated dust.
- Impact of potential light sources associated with aboveground facilities, particularly to viewers in GBNP and other public viewpoints.
- Impacts to public viewpoints visited by tourists and recreational users (e.g., GBNP, Great Basin National Heritage Route, Humboldt-Toiyabe National Forest, NWRs, scenic byways, and other formal and informal recreational areas).
- Compliance of construction and maintenance of project facilities located on public lands administered by the BLM and USFS with visual resource objectives.

Most impacts to the recreational experience are of a visual nature and are addressed in this section as direct effects to visual resources. Other potential direct impacts to recreational use areas are discussed in Section 3.9, Recreation. Visual impacts to historic trails and context-sensitive cultural sites are addressed in Section 3.16, Cultural Resources.

Assumptions

The following assumptions were used in the impact analysis for visual resources:

- All action alternatives would result in some degree of visual change to the study area because most project components would be visible from some location even though they may be remote.
- The valley or basin boundaries naturally define viewshed boundaries. Multiple valleys (i.e., viewsheds) are visible from high elevation locations.
- For purposes of this analysis, potential effects or impacts are considered either construction or maintenance-related. Construction-related impacts are assumed to be short-term (visible during construction activities or up to 2 years); maintenance-related impacts (which include the aboveground facility operations) are assumed to be long-term (visible during all of the project's anticipated lifecycle). Although the overall project construction schedule may exceed 2 years, the spread of construction activities within a basin (i.e., viewshed) would be completed within a term less than 2 years (see SNWA POD construction schedule). The residual effects of restoration are described under Section 3.5, Vegetation Resources, as long-term (greater than 2 years) for perennial herbaceous species and are addressed under long-term visual effects.
- The evaluation assumes that ACMs and BLM BMPs would be implemented and restoration activities would be successful in mitigating long-term vegetation, riparian/wetland, noxious weeds, soil, and geology impacts. If restoration is not successful, then long-term visual resource impacts would be greater than described in this assessment.

Methodology for Analysis

Surface disturbance related impacts to visual resources within the ROWs were evaluated according to the following steps.

- Forty-one KOPs were identified by field reconnaissance with BLM staff and literature review (see **Appendix F3.15**).
- BLM contrast ratings (Form 8400-4) were prepared for all KOPs associated with each alternative to determine long-term compliance with management objectives and are included in **Appendix F3.15**. The contrast ratings

considered vegetation, viewer distance, use frequency, duration of view, relationship to constituent values, visual absorption capacity, and ACMs. **Appendix F3.15** also summarizes the magnitude and extent of the contrast ratings as none, weak, moderate, or strong.

- Photographic simulations were prepared for 12 KOPs where views of the alternatives: 1) would be most visible to the public; 2) were representative of project components; or 3) occurred in visually-sensitive locations such as near scenic byways and within VRM Class II areas. As shown in **Appendix F3.15**, the simulations were based on preliminary engineering information and prepared and evaluated in accordance with BLM Handbook H-8432-1.
- Viewshed analyses for each alternative power line were conducted using GIS to evaluate the overall visibility of proposed power line structures and specific effects to GBNP, scenic byways and recreation areas. The computer-generated viewshed mapping was projected based on the power line heights in **Table 2.5-3** and **Figure 2.5-4** using a 30-meter USGS digital elevation model out to a distance of 4 miles (middleground distance zone) and for the Snake and Spring valleys out to a distance of 15 miles (background distance zone). Due to the general absence of tall land cover that could alter the actual viewshed in this landscape, the topographically-generated viewshed mapping is considered generally accurate.
- The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect visual resources from ROW construction and operation activities.

3.15.2.2 Proposed Action and Alternatives A through C

Construction and Facility Maintenance

Short-term and Long-term Visual Resource Changes within the ROWs and Project Facilities

The construction impacts associated with project development would be the same for the Proposed Action and Alternatives A through C. The anticipated time frame of proposed project construction is such that short-term visual impacts would likely be most pronounced during brief, yet intense periods of construction, followed by periods of inactivity in each valley. The proposed development within the ROW areas is described in detail in Chapter 2. The following major short-term construction activities would affect visual resources:

- Clearing, grading, construction of the pipeline, and restoration of the permanent and temporary ROW.
- Disturbance, occupancy, and restoration of 97 pipeline staging areas. Staging areas are planned to be placed approximately 3 miles apart, immediately adjacent to the pipeline ROW.
- Clearing, grading, and, in some cases, paving of access roads.
- Construction and occupancy of the Caliente Construction Support Area. Approximately 121 acres southwest of the Caliente area would be utilized for a variety of construction management and materials storage purposes.
- Construction of all aboveground facilities (pressure-reducing stations, pumping stations, regulating tanks, the buried storage reservoir, the water treatment facility, substations, transmission lines, communication facilities, and fencing).
- Disturbance, occupancy, and restoration of 19 plant nursery sites, totaling approximately 249 acres of temporary ROW.
- Disturbance, occupancy, and restoration of an undetermined number of construction camps.
- Construction and re-fill of 8 borrow pits, each approximately 7 acres in size.
- Increased vehicle traffic for worker access and large construction equipment (e.g., trucks, excavators, cranes, etc.) expected during construction. Increased traffic would produce visible activity and dust from disturbance of dry soils, which would impair viewing distances and coat vegetation.
- Increased human presence from the workforce at construction sites and staging areas, which generally are located in sparsely populated areas.

The following long-term components of the Proposed Action and Alternatives A through C would permanently modify visual resources:

- Revegetation and maintenance to the permanent ROW and temporary ROW;
- Three new pressure-reducing stations, approximately 7 acres for 2 of the stations and approximately 13 acres for the third;
- Five new pumping stations, which would vary between 24 to 40 feet above grade and would be colocated with other facilities such as an electrical substation and emergency generator;
- Six new regulating tanks, varying in size but averaging 5 acres each. Tanks may be between 130 and 200 feet in diameter and approximately 30 to 40 feet high;
- A new 40-million-gallon buried storage reservoir, belowground, in a covered concrete tank. The reservoir would be colocated with other facilities such as utility buildings and a maintenance yard in a 75-acre area;
- A new water treatment facility, with maximum building heights of 20 to 30 feet;
- New 230-, 69-, and 25-kV transmission lines. The 230-kV power poles are planned to be single, steel power poles approximately 100 feet in height; the 69-kV power poles are planned to be single, steel poles approximately 60 feet in height; the 25-kV power poles are planned to be single, wooden poles approximately 50 feet in height;
- Two new primary electrical substations (230- to 69-kV) and 5 secondary substations (69- to 25-kV);
- New access roads, paved, and unpaved;
- New communications facilities;
- New fencing and lighting; and
- Increased vehicle traffic and human presence for operations along the ROW and access roads, which generally are located in sparsely populated areas. Depending on the nature of repairs, large construction equipment (e.g., trucks, excavators, cranes, etc.) would be expected. Increased traffic would produce visible activity and dust from disturbance of dry soils, which would impair viewing distances and coat vegetation.

Short-term visual impacts from vegetation clearing and potentially grading within the ROW would occur at all project areas due to project construction. Construction of the pipeline and access roads would result in a new continuous band of moderate to strong contrasting forms, colors, and textures compared to existing conditions.

Long-term visual impacts that would result from pipelines' ROWs and access roads include new banded lines, colors, and textures on the landscape, depending on viewing position. Some pipelines and access roads would follow existing linear features (power lines, pipelines, roads, fences); in these cases, the contrast of a new line on the landscape would be reduced. The magnitude of project-related pipeline and associated disturbances generally increases as the project moves from its northern boundary to the south. When viewed from flat, lower elevations, linear surface disturbances (pipeline, ROW, roads) are generally screened by the average height of vegetation (2 to 5 feet) except when viewed parallel to the line of sight. In areas of rugged terrain, grading would level the uneven form of the landscape, which would create a weak to moderate contrast in form and texture depending on the ground surface. As the ROW parallels existing roads for the majority of the alignment, the duration of views towards the project would typically be high, and viewers would experience the project from multiple angles over long periods of travel (2 hours for viewers traveling at the 70 mph posted speed limit). Large areas of bare earth and establishing vegetation in the ROWs would be visible until the ROWs have been successfully revegetated. ROW-VEG-1: Green Stripping would be applied to ROWs that cross areas with a high risk of wildfire or weed infestation to create a fuel-break mix consisting of perennial species with low-flammability characteristics, and prevent halogeton, red brome, Russian thistle, and other weed species from spreading in Great Basin Desert low elevation shrubland. Where applied, green stripping has the potential to increase the long-term color and textural contrasts as plant structure and diversity may not emulate undisturbed areas. The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on visual resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

BLM BMPs require that access roads minimize surface disturbance and take into account the character and steepness of the landform, natural contours, cut material, depth of cut, where the fill material would be deposited, and visual contrast (Ely District Approved RMP/ROD [BLM 2008]). Implementation of the SNWA ACMs for planning and permitting (ACM A.1.1 Plan of Development), clearing and grading (ACM A.1.20 through 23, 25, 27), storm water and erosion control (ACM A.1.55, 56, 60, 66, 67, 68), noxious weeds (ACM A.1.82 to 89), restoration monitoring (ACM A.2.9 and 10), and visual resources (ACM A.11.1 through A.11.4) would help to offset the impacts of road construction. Specific visual resource ACMs would paint cut rock faces in Pahranagat Canyon to reduce the visual contrast and restore the appearance of natural desert varnish (ACM A.11.4).

Short-term visual impacts from construction of new power lines and ROWs would include vegetation clearing, grading, pole erection, and conductor pulling. Areas around the base of new power lines would likely require minor grading and new or re-developed access roads. Where an access road does not exist, such as Conner Pass, a new access road would be constructed, resulting in new lines, colors, and textures on the landscape. New access roads on steep slopes would require switchbacks where alternate access is unavailable. Conductor pulling and tensioning equipment would be located at various sites along the power line. Depending on the terrain and the number of angles and dead-end sites, numerous pull sites would likely be needed. These construction activities and associated impacts would be most visible along those portions of the study area adjacent to federal and state highways, where project facilities would be visible in the foreground, and where the ROWs cross roadways.

Long-term visual impacts of new power lines and ROWs would create new lines, forms, colors, and textures on the landscape. The direct visual impacts of new power lines depend on the size of proposed power lines and the proximity to existing lines, forms, colors, and textures of the view. As a result, the single steel pole color and form of Proposed Action and Alternatives A, B, and C would contrast to the existing wood single-pole and H-frame power lines characteristic in this region. In general, strong form and line contrasts would be seen in the foreground and middleground of 230-kV power lines (with or without 69-kV and/or 25-kV underhangs) in Steptoe, Spring, Lake, Pahranagat, Coyote Spring, Delamar, Dry Lake, Hidden North, Garnet, and Las Vegas valleys. Contrasts would be lessened where the power lines parallel existing power line corridors. Less contrast would result from 69-kV, 25-kV, and 69-kV with 25-kV underhang power lines in Spring, Snake, Hamlin, and Cave valleys. Pinyon pine and juniper woodland vegetation more than 20 feet in height in higher elevations within the project ROW may need to be trimmed or removed to provide the necessary clearance. In certain areas, this would result in an open, linear feature in an area currently characterized by a closed canopy. The proposed Caliente construction support area would be located on private land within an existing largely undeveloped industrial area, south of U.S. 93 near the existing railroad tracks and a shooting range. The area is highly visible from U.S. 93 at the southern gateway into Caliente, and has been disturbed with primarily rabbitbrush and bare ground throughout. The proposed pipe storage uses of this site would require about half of the site during the construction period and be similar in appearance to existing railroad support uses to the northeast, such as those used for storing steel track and ties.

Specific SNWA visual resource ACMs would minimize the contrast of pumping stations, the water treatment facility/buried storage reservoir, and pressure reducing stations with the colors of the surrounding landscape through architectural details and painting (ACM A.11.1), but do not address how the visual contrasts of regulating tanks, communication facilities, project signage, roofs, fences, walls, aboveground tanks and pipes, and storage yard surfaces can be reduced through materials and color (**Figures 3.15-6** and **3.15-7**).

KOP 11 Existing Conditions. Photo taken along existing road approximately 4 miles west of U.S. 93, looking east.

KOP 11 Photographic simulation of Lake Valley Pumping Station. Common to all action alternatives.

Figure 3.15-6 Key Observation Point 11

KOP 36 Existing Conditions. Photo taken along U.S. 93 approximately 15 miles south of Alamo, looking southeast.

KOP 36 Photographic simulation of Coyote Spring Valley Pressure Reducing Station. Common to all alternatives.

Figure 3.15-7 Key Observation Point 36

Residents and travelers in the foreground and middleground of Proposed Action and Alternatives A, B, and C would be able to see operation activities, which would be performed using vehicles and, at times, heavy equipment and cranes. Intermittent, annual maintenance activities would result in contrasts to the visual environment ranging from none to weak. Impacts to visual resources also are expected to be intermittent over the life of the project.

Conclusion. Short-term effects to the scenic quality and viewer sensitivity of the study area would result from the construction of the pipeline, aboveground facilities and power lines; project surface disturbance (ROW); increased vehicle traffic and increased human presence; and construction-generated dust. Project surface disturbance areas would require vegetation clearing, grading, occupancy, and restoration activities.

Facility operation and maintenance would locally change the long-term character of the landscape in most of the study area, which contains only minor human modification north of Apex. Long-term impacts to visual resources would consist of moderate to strong form, line, color, and texture contrasts of the revegetated pipeline ROW, access roads, transmission lines, and non-linear project components with the existing predominantly natural setting. Periodic vehicle and worker activity associated with operations and maintenance would be periodically visible.

Proposed mitigation measures:

The following mitigation measures are not currently addressed in BLM BMPs or SNWA ACMs, and are intended to further reduce visual contrasts from ROW surface disturbance, power lines, non-linear project elements, and indirect OHV trail developments. Additional mitigation measures for vegetation resources (ROW-VEG-1) also would apply to visual resources.

ROW-VR-1: ROW Width Reduction. **ROW-VR-1: ROW Width Reduction**. SNWA, in consultation with the BLM, would reduce the width of permanent ROW and temporary construction ROW to the smallest width feasible in Pahranagat Canyon, VRM Class II areas, and within 1,000 feet adjacent to scenic byways (U.S. 50/6/93) to minimize visual contrasts where feasible. The permanent and temporary ROW width can be reduced through narrower roads within the ROW, steeper trench walls, vertical trenching and/or trench boxes, and reducing the ROW width in relation to the size of the pipeline (e.g., a 16-inch pipeline would require less ROW than an 84-inch pipeline). Effectiveness: This measure may be effective in reducing visual contrast of the permanent and temporary construction ROW in visually-sensitive locations. Pahranagat Canyon, VRM Class II areas, and ROWs within 1,000 feet adjacent to scenic byways account for approximately 50 miles, or 15 percent of the project. For example, in the Pahranagat Canyon area and other locations where rock faces within the ROW would be cut for construction, reducing the facility area to the minimum necessary would reduce rock cuts and minimize surface disturbance, thereby avoiding strong contrasts. Effects on other resources: Application would result in beneficial effects to vegetation, geology, wildlife, and soil resources as surface disturbance and rock cuts would be reduced in specific locations.

ROW–VR-2: Power Line Structure Design. **ROW–VR-2: Power Line Structure Design**. Where locating new power lines adjacent to existing lines, the existing pole type, color, and span length would be matched to the extent feasible. In areas where there are no existing power lines, SNWA would consult with the BLM during project design to select the most appropriate structure design from the following: wood H-frame structures or single steel poles for 230-kV power lines and single wood poles or single steel poles for 69-kV and 25-kV. All steel poles would be surfaced with Shadow Grey paint in sage/creosote plant communities and self-weathering Corten in pinyon pine plant communities. Effectiveness: This measure may be effective in reducing the visual contrast of high-voltage power lines. Parallel lines which are not matched (in height, structure materials, span length, and location), appear uncoordinated and unnecessarily chaotic, and as such, draw additional attention. For new transmission corridors, structures should resemble the existing transmission structures in the vicinity. Utilizing wood H-frame and single, wooden poles and painted and self-weathering steel structures would reduce the industrial character of galvanized steel structures (see photographic simulations for KOPs 23 and 34 in **Appendix F3.15**). Effects on other resources: If selected by BLM, increased ground disturbance would result from application of H-frame structures compared to single steel poles. Wood power lines may also require a larger number of structures due to shorter span lengths. These design features would not affect other resource values.

ROW–VR-3: Power Line Conductor and Insulator Design. **ROW–VR-3: Power Line Conductor and Insulator Design**. Conductors would be non-specular and non-reflective. Insulators would be porcelain or polymer material to reduce reflection and refraction. Effects on other resources: Application of these design features may increase the risk

of avian collisions and electrocution with power lines. SNWA, with approval by BLM, will determine to what extent bird diverters would be necessary to reduce bird collisions and electrocution (ACM A.5.8).

ROW–VR-4: Surface Treatment of Project Structures and Buildings. SNWA would consult with BLM on surface treatments. All aboveground, non-electric project structures and buildings would utilize architectural details and be painted or constructed of colored block to blend with the colors of the surrounding landscape, per BLM Manual 8400 – Visual Resources Management. Shadow Grey for sagebrush shrub and shrubland cover types and Beetle for pinyon-juniper woodland should be selected from the BLM Standard Environmental Colors Chart CC-001. Ground surfaces of permanent storage yards that would not be revegetated should have a top-dressing of 2 inches of dark colored aggregate to minimize color contrast. Non-reflective and non-glare paints would be utilized with proper treatment maintenance for the life of the project (see **Appendix F3.15** of the Final EIS for site-specific mitigation). Effectiveness: Treating all surfaces of all project structures and buildings visible to the public such that a) their colors minimize visual intrusion and contrast by blending with the landscape; b) their colors and finishes do not create excessive glare; and c) their colors and finishes are consistent with local policies and ordinances will completely mitigate color contrasts in the middleground and background. Residual visual contrasts of treated structures will remain though at a reduced intensity, since changes from the form, line, and texture of proposed facilities cannot be completely mitigated by color. Effects on other resources: Application would not affect other resource values.

ROW–VR-5: Facility Siting. SNWA would review facility site locations with the BLM to determine if design features or adjustments could be made to limit the visibility of non-linear facilities. The colocation of facilities has been incorporated into the POD; however, further adjustments for the colocation of non-linear facilities with related project facilities or existing facilities would be reviewed with the BLM. Distance, terrain, and vegetation screening would be utilized to limit the visibility of non-linear facilities. Facility siting to minimize visibility would be subject to engineering and safety requirements that may constrain siting (see **Appendix F3.15** of the Final EIS for site-specific mitigation). Effectiveness: This measure may be effective in reducing the overall visual contrast of facilities within the ROWs. Colocating proposed facilities with other proposed or existing facilities and colocating proposed facilities in previously disturbed areas would be moderately effective. Additive visual effects would occur but at a lesser degree of contrast as scenic integrity and landscape fragmentation would be reduced. For example, at the U.S. 93 crossing in Delamar Valley (**Appendix F3.15**, KOP 5 simulation), the Proposed Action and Alternatives A through C locate a primary electrical substation on the south side of the highway and a regulating tank site on the north side of the highway. Colocating the two facilities on the same side of the highway would reduce landscape fragmentation. Siting facilities behind terrain and vegetation, avoiding placement of buildings on high land features and along "skylines," and/or locating facilities more than 0.5 mile from designated viewing locations would conceal or reduce changes. For example, at KOP 11 in Lake Valley, a pumping station is located in a recently burned area at the crest of a slope which makes it appear skylined from U.S. 93 (scenic byway). Relocating the pumping station 2,500 feet to the west into the pinyon-juniper stands and behind the ridge would reduce visual contrasts. Proposed facilities would be less visible from viewpoints with high viewer sensitivity or high use volumes, but would remain visible for other viewers. Effects on other resources: Application could affect other resource values, if new locations contain other sensitive resources that would be impacted. The BLM would consider the effects of colocation and other adjustments on other resources values as part of their approval of the final facility sites in the detailed POD.

Additional KOP-specific mitigation measures are described where necessary in each Contrast Rating Form to reduce visual impacts further (see **Appendix F3.15)**.

Residual impacts include:

- Given climatic constraints on successful re-vegetation in the study area region, potential visual impacts resulting from changes in woody vegetation in disturbed areas would be visible in the long term until woody vegetation becomes re-established, especially in the linear pipeline/power line ROW.
- While texture and color contrasts might be partially mitigated by using appropriate earth-toned building materials and colors, in general, new buildings, structures, and their shadows would be prominent in the foreground.

Lighting Impacts

Some construction activities would occur during nighttime work shifts. Lighting needed to conduct construction (including drilling and pipeline construction) at night will be limited to the basic requirements to conduct the work and

not onto surrounding areas and roads. BLM RMP BMPs and SNWA ACMs (A.11.2 and A.11.3) for nighttime lighting would minimize light requirements; utilize anti-glare light fixtures, shield and direct lighting downward during construction and operation, and either be manually controlled and used only when occupied or be motion activated if needed for safety and security. These protection measures would be effective in reducing the intensity and frequency of project lighting effects. With implementation of BLM BMPs and SNWA ACMs during the construction period, impacts to nighttime scenic quality would be negligible and temporary.

Lighting to support project operation would be needed throughout the life of the project and would likely be less intense and less frequent than during construction or than the typical effects of a single family residence; therefore, new light sources would pose negligible impacts to nighttime viewsheds. No direct light sources (glare) would be visible from higher elevations. Indirect (rebound) lighting of project facilities may be seen, but would not attract the attention of the casual observer. The degree of contrast associated with intermittent nighttime lighting depends on proximity, the intensity of specific lighting sources, the viewer's desired experience, and the background or ambient level of combined nighttime lighting in the study area. For example, shielded lighting required for pumping and substation facilities in Snake Valley would be substantially less in extent and intensity than the existing unshielded lights in the nearby towns of Baker and Garrison. The downward directed, shielded lighting would be intermittently visible, but would not significantly contribute to sky glow in the night-time sky. The proposed night-lighting is consistent with lighting guidelines suggested by the International Dark-Sky Association to reduce night-time sky glow (International Dark Sky Association undated).

Conclusion. Exterior lighting for nighttime safety and security would be seen but would not attract attention during construction and project operations.

Proposed mitigation measures:

None.

Residual impacts include:

- Project aboveground facility light sources would be seen but would not attract attention, at an intensity less than the typical effects of a single family residence.

Impacts to Sensitive Viewpoints

Long-term effects would occur at designated recreation and viewing locations, such as scenic byways and recreation and wilderness areas. Recreationists in these areas expect to experience undeveloped or natural viewsheds with high scenic integrity and generally have high sensitivity to visual changes. **Table 3.15-2** shows the length of scenic byways where the power line would be visible within the foreground and middle-ground areas. The direct visual impacts within the viewshed of scenic byways depend on existing lines, forms, colors, and textures of the view, and are documented in **Appendix F3.15**, Visual Resources.

Table 3.15-2 Proposed Action and Alternatives A through C Power Line Impacts to Scenic Byways and Recreation Areas

Total Length (Miles) of Proposed Action and Alternatives A, B, and C Power Line	Scenic Byway Visible within 0.5 mile of Power Lines (Miles)	Scenic Byway Visible within 4 miles of Power Lines (Miles)
323	28	65

Of the 37 KOPs analyzed for the Proposed Action (the remaining 4 KOPs were analyzed for options), 24 would experience moderate to strong visual contrasts as a result of the Proposed Action and Alternatives A through C, as shown in **Appendix F3.15**, Visual Resources.

Recreation and wilderness areas visible within 4 miles of the Proposed Action and Alternatives A through C power lines include the following (see **Figures 3.9-1**, **3.14-1**, **3.14-2**):

- Arrow Canyon Wilderness Area;
- Baker Archaeological Site ACEC;
- Baking Powder Flat ACEC;
- BLM Elk Viewing and Interpretive Area off of U.S. 6/50/93;
- BLM Silver State and Rainbow Canyon Backcountry Byways (57 miles);
- Caliente SRP Area;
- Cave Lake State Park;
- Chief Mountain OHV Trail;
- Chief Mountain SRMA;
- Comins Lake bird-watching area;
- Coyote Springs ACEC;
- Delamar Mountains Wilderness Area;
- Far South Egans Range Wilderness Area;
- Fortification Range Wilderness Area;
- Great Basin National Heritage Area and Route;
- GBNP;
- High Schells Wilderness Area;
- Highland Ridge Wilderness Area;
- Kane Springs ACEC;
- Loneliest Highway SRMA;
- Mormon Mesa ACEC;
- Mountain Grafton Wilderness Area;
- North Delamar SRMA;
- Pioche SRP Area;
- Silver State OHV Trail;
- Snake Creek Indian Burial Cave;
- Steptoe Valley WMA;
- Swamp Cedar Natural Area;
- USFWS Managed Lands (76,064 acres); and
- Wheeler Peak Critical Viewing Area.

Many of these recreation areas occur at higher elevations, such as wilderness areas and GBNP, and moderate to strong contrasts from new banded lines, forms, and colors would be visible.

A viewshed analysis (**Appendix F3.15**, Visual Resources) for the proposed facilities within the ROWs and the groundwater development areas was prepared using GIS to identify all areas of the GBNP that would have views of

proposed project activities. The computer-generated viewshed mapping was projected from power line heights based on **Table 2.5-3** and **Figure 2.5-4**, using a 30-meter USGS digital elevation model, out to a distance of 15 miles (background distance zone). Night lighting from construction and operation activities were not considered in selecting the viewshed analysis distance, as nighttime impacts would typically be negligible as described under Lighting Impacts.

The GBNP encompasses most of the South Snake Range, which is oriented north to south through the Park forming the divide between Spring Valley viewsheds to the west and Snake Valley viewsheds to the east. Most GBNP visitor facilities are on the east side of the Snake Range divide in Snake Valley. The majority of these facilities, roads, and trails are on north-facing slopes or in drainages and canyons with relatively enclosed viewsheds that do not provide views of the proposed project in Snake Valley. Evidence of visual change would be seen from the summit of Wheeler Peak, trails along the crest of the divide, a portion of the Wheeler Peak Scenic Drive, recorded or unrecorded cultural resource sites, rock art locations, and other roads, trails, and dispersed recreational areas along the upper west aspects of the Snake Range near the divide. These view points are located 10 or more miles from proposed ROW facilities in Snake Valley which would appear as an indistinct band of lighter, smoother vegetation and small block buildings. As depicted in the viewshed analysis of the project towards the GBNP, the project would not be visible from the Lehman Caves Visitor Center, the Lehman Caves, and primitive and developed campgrounds along the Snake Creek (**Appendix F**, **Figure F3.15-1**).

Evidence of visual change in Spring Valley would be seen from dispersed recreation areas on west aspects of the divide and high peaks, from Wheeler Peak summit, a portion of the Wheeler Peak Trail that extends north of the summit along the crest of the divide, and a primitive trail along the crest of the divide that extends south from a location above Baker Lake to Highland Ridge. These new points are located 10 or more miles from proposed ROW facilities and would overlook the project from a high elevation, with a distant view of project facilities. The project would appear as an indistinct band of lighter, smoother vegetation and small block buildings paralleling existing roads. No other defined view point areas would provide views of proposed activities in Spring Valley.

Outside of the GBNP, the proposed project would be within the viewsheds of the Great Basin Visitor Center, and motorists on the main access road (SR 488) and Snake Creek Road west of SR 487 near the town of Baker. The Great Basin Visitor Center, located north of the town of Baker on SR 487, is approximately 2.8 miles north-northwest of the proposed transmission line and more than 5 miles from the proposed pumping station. Views to the transmission line and other facilities would be blocked by tree stands in the town and lining the highway, and by intervening buildings in the town. The shielded night lighting of the pumping station, a secondary substation, and additional pumping station located approximately 6.5 miles to the south-southeast would also be screened by intervening trees and buildings.

The groundwater development area alongside and north of Baker is an exploration area that would contain an estimated 39 to 48 of production wells in unknown locations. There would be a minimum of 1 mile between each well. Production facilities would be enclosed in a concrete structure. A small number of these structures may be visible from Baker and the Visitor Center depending on screening from trees, landform, and structures.

The pumping stations and secondary substations would be within the foreground distance zone of motorists traveling on SR 487.

Conclusion. Construction and long-term impacts would be visible from scenic viewpoints visited by tourists and recreational users within the foreground of scenic byways and recreation and wilderness areas. The proposed project would be visible along those portions of the study area adjacent to federal and state highways, where transmission lines or substations would be visible in the foreground, and where the project crosses roadways. The Proposed Action and Alternatives A through C would be highly visible within the foreground (0 to 0.5 mile) of approximately 28 miles of scenic byways and within the middleground (0.5 to 4 miles) of approximately 65 miles of scenic byways. Moderate to strong contrasts would occur at 24 of the 36 KOPs analyzed for the Proposed Action and Alternatives A through C. ROW facilities would be located in a distant view (10 or more miles) from high points in GBNP.

When combined, these ROW area surface-disturbing activities would result in direct visual impacts. The scale of surface-disturbing construction activities, visibility adjacent to federal and state highways and scenic byways, and duration throughout the construction and undetermined operation periods would result in short- and long-term visual impacts.

Proposed mitigation measures:

- Application of Additional Mitigation Measures ROW-VR-1 through ROW-VR-5 (which is not currently addressed in BLM BMPs or SNWA ACMs) would reduce visual impacts to sensitive viewpoints from the Proposed Action, and Alternatives A through C.
- Additional KOP-specific mitigation measures are described in applicable contrast rating forms in order to reduce impacts further (see **Appendix F3.15)**.

Residual impacts include:

- The scale of linear aboveground and surface-disturbing activities (across more than 300 miles), high visibility from scenic byways and special designation areas, and duration within view (for 2 hours for viewers traveling on U.S. 93 at the 70 mph posted speed limit) would result in long-term visual impacts from sensitive viewpoints.

Compliance with Visual Resource Objectives on Public Lands

In the short term, BLM VRM objectives would generally not be met during construction of the pipeline, power line, pipeline staging areas, and GWD Project facilities. Short-term changes are likely to be most pronounced during brief, yet intense periods of activity, followed by periods of inactivity.

The appearance of ROWs in the process of revegetation would result in strong color, line, and texture contrasts as seen long-term from scenic byways, recreation use areas, and KOPs. These contrasts would be prominent along adjacent highways and elevated KOPs.

The approximate number of acres potentially affected under the Proposed Action and Alternatives A, B, and C are listed in **Table 3.15-3** by BLM VRM Class. When considered in addition to the ON Line Transmission Project in the Coyote Spring Valley, Delamar Valley, Dry Lake Valley, and Muleshoe Valley, the scale and height of this 500-kV power line would substantially reduce the form, line, color, and texture contrasts of the proposed power line and revegetated pipeline ROW and therefore would generally not dominate the view of the casual observer.

Table 3.15-3 Proposed Action, Alternatives A through C, Construction Surface Disturbance Acres by Basin by VRM Class

Basins	VRM Classes			Total
	II	III	IV	
Cave Valley	0	0	712	712
Coyote Spring Valley	0	1,179	498	1,676
Delamar Valley	0	69	799	868
Dry Lake Valley	0	52	2,571	2,623
Garnet Valley	0	304	0	304
Hamlin Valley	0	0	384	384
Hidden Valley (North)	0	478	0	478
Lake Valley	0	0	804	804
Las Vegas Valley	0	158	0	158
Lower Meadow Valley Wash	0	0	0	0
Pahranagat Valley	0	10	242	252
Snake Valley	0	302	578	879
Spring Valley	79	208	2,265	2,552
Steptoe Valley	86	73	163	322
Total	**166**	**2,833**	**9,015**	**12,014**

Note: The totals may be slightly different than the sum of each row and column due to rounding errors.

Table 3.15-4 shows the length of BLM VRM Classes crossed by the Proposed Action and Alternatives A through C pipeline centerlines.

Table 3.15-4 Proposed Action, Alternatives A through C, Miles of Pipeline Centerlines Crossing VRM Classes

Basins	VRM Classes			Total
	II	III	IV	
Cave Valley	0	0	19	19
Coyote Spring Valley	0	27	13	39
Delamar Valley	0	3	20	23
Dry Lake Valley	0	2	68	70
Garnet Valley	0	7	0	7
Hamlin Valley	0	0	10	10
Hidden Valley (North)	0	12	0	12
Lake Valley	0	0	21	21
Las Vegas Valley	0	6	0	6
Pahranagat Valley	0	0	7	7
Snake Valley	0	8	16	24
Spring Valley	1	4	59	64
Steptoe Valley	0	0	0	0
Total	**1**	**69**	**231**	**301**

Note: The totals may be slightly different than the sum of each row and column due to rounding errors.

Table 3.15-5 shows the length of BLM VRM Classes crossed by the Proposed Action and Alternatives A through C power lines.

Table 3.15-5 Proposed Action, Alternatives A through C, Miles of Power Lines Crossing VRM Classes

Basins	VRM Classes			Total
	II	III	IV	
Cave Valley	0	0	19	19
Coyote Spring Valley	0	28	11	40
Delamar Valley	0	0	23	23
Dry Lake Valley	0	0	68	68
Garnet Valley	0	2	0	2
Hamlin Valley	0	0	10	10
Hidden Valley (North)	0	12	0	12
Lake Valley	0	0	21	21
Las Vegas Valley	0	0	0	0
Pahranagat Valley	0	0	6	6
Snake Valley	0	8	16	24
Spring Valley	5	7	59	71
Steptoe Valley	7	6	13	27
Total	**12**	**64**	**245**	**321**

Note: The totals may be slightly different than the sum of each row and column due to rounding errors.

As shown in **Tables 3.15-3** through **3.15-5**, the Proposed Action and Alternatives A through C cross BLM lands managed as VRM Class II in Spring Valley and Steptoe Valley as described below and in **Appendix F3.15**:

- Over Conner Pass between Spring Valley and Steptoe Valley, the proposed power line structures would create a new corridor ascending Conner Pass visible from KOPs 21 and 34 outside of a designated utility corridor. The clearing of existing shrubs and trees from the power line along the slopes of the ridge would create a path of disturbance; and steep terrain would require access road switchbacks and pads for power line structure construction. Pinyon-juniper community would effectively screen the cleared corridor, access roads, and lower portions of the power lines when not parallel to viewers. The power line would be visible from the scenic byway in Spring Valley, however the effect would be transient for vehicles traveling on the highway and management objectives for the VRM Class IV Spring Valley Utility Corridor would be met. Selecting the Option 1 Humboldt-Toiyabe power line alignment would have less of an impact on the landscape because it follows an existing 230-kV transmission corridor and the visibility from scenic byways would be less than the Proposed Action.
- In Steptoe Valley, the proposed power line would be seen 0.9 mile from KOP 29 (NDOW Elk Viewing and Interpretive Area) off of U.S. 6/50/93 (scenic byway), would not follow existing linear features or a designated utility corridor, and would attract attention across the foreground, resulting in moderate form, color, and line contrasts that would not be compatible in a VRM Class II area. Selecting the Option 1 Humboldt-Toiyabe power line alignment would have less of an impact on the landscape because it follows multiple existing 230-kV transmission corridors and the visibility from scenic byways would be less than the Proposed Action.
- In Steptoe Valley, as seen from KOPs 29 and 31 along U.S. 6/50/93 (scenic byway) 7 miles west of Connor Pass, the proposed power line would roughly parallel the highway for 2 miles and cross it at an angle of about 35 degrees, continuing on in a predominantly north-south direction. This alignment and crossing outside of a designated utility corridor, would dominate the landscape when travelling along the scenic byway in both directions, resulting in strong form and moderate color and line contrasts that would not be compatible in a VRM Class II and III areas. Selecting the Option 1 Humboldt-Toiyabe power line alignment would have less of an impact on the landscape because it follows multiple existing 230-kV transmission corridors and the visibility from scenic byways would be less than the Proposed Action.
- In Spring Valley, approximately 1 mile of power line and pipeline ROW would cross VRM Class II lands when the pipeline leaves the VRM Class IV LCCRDA utility corridor. The proposed project would not be visible from scenic byways or major roads or KOPs. Viewers close to the project on BLM roads would notice the line, but would not likely have their attention unduly attracted. The noticeability of the line to viewers would diminish with distance, as it would increasingly blend with the background landscape. Through the application of additional mitigation measures ROW-VR-1 through ROW-VR-5 (which are not currently addressed in BLM BMPs or SNWA ACMs), the Proposed Action and Alternatives A through C would meet BLM VRM Class II objectives.

Evidence of landscape appearance changes from the proposed project ROWs in Snake and Spring valleys would be seen from high elevations such as Wheeler Peak within the GBNP, appearing as a band of lighter, smoother vegetation, and small block buildings generally parallel to existing highways at a distance of 10 miles or more. These changes are not expected to meet the intent of NPS scenery management objectives beyond GBNP boundaries.

Conclusion. Construction activities would not be consistent with BLM visual resource objectives during the construction phase in VRM Class II portions of the GWD Project study area. Approximately 166 acres of land classified as VRM Class II and 2,833 acres of land classified as VRM Class III would be affected by the construction of proposed GWD Project facilities (**Table 3.15-3**). The proposed pipeline would cross approximately 1 mile of land managed as VRM Class II and 69 miles of land classified as VRM Class III (**Table 3.15-4**). The proposed power line would cross approximately 12 miles of land managed as VRM Class II and 64 miles of land classified as VRM Class III (**Table 3.15-5**).

Proposed mitigation measures:

- Through the application of additional mitigation measures ROW-VR-1 through ROW-VR-5 (which are not currently addressed in BLM BMPs or SNWA ACMs), the Proposed Action and Alternatives A through C would meet BLM VRM Class objectives.
- Additional KOP-specific mitigation measures are described in applicable contrast rating forms in order to reduce impacts further (see **Appendix F3.15)**.

Residual impacts include:

- Although outside of the GBNP boundary, the Proposed Action and Alternatives A through C where seen from high elevations with a maximum view in GBNP such as Wheeler Peak would not meet the intent of NPS scenery management objectives beyond GBNP boundaries.

3.15.2.3 Alternative D

The same ROW construction and operation types of effects discussed for the Proposed Action would apply to Alternative D, except that impacts would be limited to Clark and Lincoln counties (including Cave, Delamar, and Dry Lake valleys, as well as the Lincoln County portion of Spring Valley). Under Alternative D, approximately 8,843 acres would be affected across 225 miles of pipeline and 208 miles of power lines (compared to over 12,000 acres of surface disturbance), 306 miles of pipeline, and 323 miles of power lines under the Proposed Action (see **Tables 2.6-10** and **2.6-12**). Impacts to views from GBNP would generally be avoided in Alternative D and NPS visual resource objectives would be met.

Short-term and Long-term Visual Resource Changes within the Rights-of-way and Project Facilities

Short-term effects to the scenic quality and viewer sensitivity of the study area would result from the construction of the pipeline, aboveground facilities and power lines; project surface disturbance; increased vehicle traffic and increased human presence; and construction-generated dust. Project surface disturbance areas would require vegetation clearing, grading, occupancy, and restoration activities. The scenic quality of approximately 8,843 acres across more than 225 miles would be affected in the study area.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on visual resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Proposed mitigation measures:

- Through the application of additional mitigation measures ROW-VR-1 through ROW-VR-5 (which are not currently addressed in BLM BMPs or SNWA ACMs), visual impacts would be reduced for Alternative D.

Residual impacts include:

- Given climatic constraints on successful re-vegetation in the study area region, potential visual impacts resulting from changes in woody vegetation in disturbed areas would be visible for a long-term duration until woody vegetation becomes re-established, especially in the linear pipeline/power line ROW.
- While texture and color contrasts might be partially mitigated by using appropriate earth-toned building materials and colors, in general, new buildings, structures, and their shadows would be prominent in the foreground.

Lighting Impacts

Some construction activities would occur during night work shifts. Lighting needed to conduct construction (including drilling and pipeline construction) at night will be limited to the basic requirements to conduct the work. Lighting will be shielded, directed down towards the site and not into surrounding areas or onto roads, and either be manually controlled and used only when occupied or be motion activated if needed for safety and security (ACMs A.11.2 and A.11.3). These protection measures would be moderately effective by limiting the intensity and frequency of project

lighting effects. Construction lighting would not permanently alter the nighttime viewshed and would not be significant.

Exterior lighting for nighttime safety and security would be activated by activity at the specific site and when activated would briefly alter nighttime light conditions in the study area as viewed from scenic byways and recreation areas, federal and state highways, and specific KOPs. No aboveground facility lighting effects would occur in Snake Valley and the White County portion of Spring Valley.

Proposed mitigation measures:

None.

Residual impacts include:

- Project aboveground facility light sources would be seen but would not attract attention, at an intensity less than the typical effects of a single family residence.
- Impacts to Sensitive Viewpoints.

Construction and long-term impacts would be visible from scenic viewpoints visited by tourists and recreational users within the foreground of scenic byways and recreation and wilderness areas, including from cultural resource sites or rock art locations, along those portions of the study area adjacent to federal and state highways, where transmission lines and ROWs or substations would be visible in the foreground, and where the project crosses roadways. Alternative D would be highly visible within the foreground (0 to 0.5 mile) of 1.5 miles of scenic byways, within the middleground (0.5 to 4 miles) of 9.8 miles of scenic byways and from the following recreation areas (see **Figures 3.9-1**, **3.14-1**, **3.14-2**):

- BLM Silver State and Rainbow Canyon Backcountry Byways (57 miles);
- Kane Springs ACEC;
- Chief Mountain OHV Trail;
- Chief Mountain SRMA;
- North Delamar SRMA;
- Caliente SRP Area;
- Pioche SRP Area; and
- USFWS Managed Lands (76,064 acres).

When combined, these ROW area surface-disturbing activities and nighttime lighting would result in direct visual impacts. The scale of surface-disturbing construction activities, visibility adjacent to federal and state highways and scenic byways, and duration throughout the construction and undetermined operation periods would result in short- and long-term visual impacts.

Proposed mitigation measures:

- Application of additional mitigation measures ROW-VR-1 through ROW-VR-5 (which are not currently addressed in BLM BMPs or SNWA ACMs) would reduce visual impacts to sensitive viewpoints for Alternative D.
- Additional KOP-specific mitigation measures are described in applicable contrast rating forms in order to reduce impacts further (see **Appendix F3.15)**.

Residual impacts include:

- Residual impacts (across 225 miles) would be similar to the Proposed Action and Alternatives A through C.

Compliance with Visual Resource Objectives on Public Lands

Compliance with BLM, USFS, NPS, and scenic byway visual resource objectives would be the same as the Proposed Action. Approximately 36 acres of land classified as VRM Class II, and 2,250 acres of land classified as VRM Class III would be affected by the construction of proposed project facilities as shown in **Table 3.15-6**. All KOP contrast ratings would meet BLM visual resource objectives.

Table 3.15-6 Alternative D, Construction Surface Disturbance Acres by Basin and by VRM Class

Basins	VRM Classes			Total
	II	III	IV	
Cave Valley	0	0	712	712
Coyote Spring Valley	0	1,179	498	1,676
Delamar Valley	0	69	799	868
Dry Lake Valley	0	52	2,571	2,623
Garnet Valley	0	304	0	304
Hamlin Valley	0	0	0	0
Hidden Valley (North)	0	478	0	478
Lake Valley	0	0	804	804
Las Vegas Valley	0	158	0	158
Lower Meadow Valley Wash	0	0	0	0
Pahranagat Valley	0	10	242	252
Snake Valley	0	0	0	0
Spring Valley	36	0	646	682
Steptoe Valley	0	0	0	0
Total	**36**	**2,251**	**6,272**	**8,559**

Note: The totals may be slightly different than the sum of each row and column due to rounding errors.

Table 3.15-7 shows the length of BLM VRM Classes crossed by the Alternative D pipeline.

Table 3.15-7 Alternative D, Pipeline Centerline Miles by Basin and by VRM Classes

Basins	VRM Classes			Total
	II	III	IV	
Cave Valley	0	0	19	19
Coyote Spring Valley	0	26	13	39
Delamar Valley	0	3	20	23
Dry Lake Valley	0	2	68	70
Garnet Valley	0	7	0	7
Hamlin Valley	0	0	0	0
Hidden Valley (North)	0	12	0	12
Lake Valley	0	0	21	21
Las Vegas Valley	0	6	0	6
Pahranagat Valley	0	0	7	7
Snake Valley	0	0	0	0
Spring Valley	1	0	16	16
Steptoe Valley	0	0	0	0
Total	**1**	**57**	**163**	**220**

Note: The totals may be slightly different than the sum of each row and column due to rounding errors.

Table 3.15-8 shows the length of BLM VRM Classes crossed by the Alternative D power lines.

Table 3.15-8 Alternative D, Power Lines Crossing Miles by Basin and by VRM Classes

Basins	VRM Classes			Total
	II	III	IV	
Cave Valley	0	0	19	189
Coyote Spring Valley	0	28	11	40
Delamar Valley	0	0	23	23
Dry Lake Valley	0	0	68	68
Garnet Valley	0	2	0	2
Hamlin Valley	0	0	0	0
Hidden Valley (North)	0	12	0	12
Lake Valley	0	0	21	17
Las Vegas Valley	0	0	0	0
Pahranagat Valley	0	0	6	6
Snake Valley	0	0	0	0
Spring Valley	1	0	15	16.
Total	**1**	**43**	**163**	**208**

Note: The totals may be slightly different than the sum of each row and column due to rounding errors.

Proposed mitigation measures:

- Through the application of additional mitigation measures ROW-VR-1 through ROW-VR-5 (which are not currently addressed in BLM BMPs or SNWA ACMs), Alternative D would meet NPS and BLM visual resource objectives.
- Additional KOP-specific mitigation measures are described in applicable contrast rating forms in order to reduce impacts further (see **Appendix F3.15)**.

Residual impacts include:

None.

3.15.2.4 Alternative E

The same ROW construction and operation types of effects discussed for the Proposed Action would apply to Alternative E, except that impacts would not occur in Snake or Hamlin valleys, ancillary facilities would be downsized, and three rather than five pumping stations would be required. Under Alternative E, approximately 10,700 acres would be affected by 263 miles of pipeline and 280 miles of power lines (compared to 306 miles of pipeline and 323 miles of power lines under the Proposed Action). Impacts to views east of GBNP would be avoided in Alternative E.

Short-term and Long-term Visual Resource Changes within the Rights-of-way and Project Facilities

Short-term effects to the scenic quality and viewer sensitivity of the study area would result from the construction of the pipeline, aboveground facilities and power lines; project surface disturbance; increased vehicle traffic and increased human presence; and construction-generated dust. Project surface disturbance areas would require vegetation clearing, grading, occupancy, and restoration activities. No changes to scenic quality in Snake Valley would occur.

Facility operation and maintenance would substantially change the long-term character of the landscape in most of the study area, which contains only minor human modification north of Apex. Long-term impacts to visual resources would consist of moderate to strong form, line, color, and texture contrasts of the revegetated pipeline ROW, access

roads, transmission lines, and non-linear project components with the existing predominantly natural setting. Periodic vehicle and worker activity associated with operations and maintenance would be visible.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on visual resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Proposed mitigation measures:

- Application of additional mitigation measures ROW-VR-1 through ROW-VR-5 (which are not currently addressed in BLM BMPs or SNWA ACMs) would reduce visual impacts of Alternative E.
- Additional KOP-specific mitigation measures are described in applicable contrast rating forms in order to reduce impacts further (see **Appendix F3.15)**.

Residual impacts include:

- Given climatic constraints on successful revegetation in the study area region, potential visual impacts resulting from changes in woody vegetation in disturbed areas would be visible for a long-term duration until woody vegetation becomes re-established, especially in the linear pipeline/power line ROW.
- While texture and color contrasts might be partially mitigated by using appropriate earth-toned building materials and colors, in general, new buildings, structures, and their shadows would be prominent in the foreground.

Lighting Impacts

Some construction activities would occur during night work shifts. Lighting needed to conduct construction (including drilling and pipeline construction) at night will be limited to the basic requirements to conduct the work. Lighting will be shielded, directed down towards the site and not into surrounding areas or onto roads, and either be manually controlled and used only when occupied or be motion activated if needed for safety and security (ACMs A.11.2 and A.11.3). These protection measures would be moderately effective by limiting the intensity and frequency of project lighting effects. Construction lighting would briefly alter the nighttime viewshed.

When activated, exterior lighting for nighttime safety and security would briefly alter nighttime light conditions in the study area during project operations as viewed from scenic byways and recreation areas, federal and state highways, as well as specific KOPs. No project lighting effects would occur in Snake Valley.

Proposed mitigation measures:

None.

Residual impacts include:

Project aboveground facility light sources would be seen but would not attract attention, at an intensity less than the typical effects of a single family residence.

Impacts to Sensitive Viewpoints

Construction and long-term impacts would be visible from scenic viewpoints visited by tourists and recreational users within the foreground of scenic byways and recreation and wilderness areas, along those portions of the study area adjacent to federal and state highways, where transmission lines or substations would be visible in the foreground, and where the project crosses roadways. Visibility of Alternative E from scenic byways and recreation areas would be the same as the Proposed Action except that the project would not be visible from KOPs 14, 15 16, 17, 18, 19, 20, 27, 28, and 41.

When combined, these ROW area surface-disturbing activities and nighttime lighting would result in direct visual impacts. The scale of surface-disturbing construction activities, visibility adjacent to federal and state highways and scenic byways, and duration within throughout the construction period would result in short- and long-term visual impacts. These effects would also occur over the operation period, which is of an undetermined duration.

Proposed mitigation measures:

- Application of additional mitigation measures ROW-VR-1 through ROW-VR-5 (which are not currently addressed in BLM BMPs or SNWA ACMs) would reduce visual impacts to Alternative E.

Residual impacts include:

- Residual impacts (across 280 miles) would be similar to the Proposed Action and Alternatives A through C.

Compliance with Visual Resource Objectives on Public Lands

Compliance with BLM, USFS, NPS, and scenic byway visual resource objectives would be the same as the Proposed Action. The acres of VRM Class II, III, and IV lands impacted by Alternative E would be the same as the Proposed Action in all basins except Snake Valley and Hamlin Valley, where no facilities would be constructed. **Table 3.15-9** summarizes the acres of land affected by the proposed project facilities under Alternatives E and F in VRM classes. All KOP contrast ratings would meet BLM visual resource objectives.

Table 3.15-9 Alternatives E and F, Construction Surface Disturbance Acres by Basin and by VRM Class

Basins	VRM Classes			Total
	II	III	IV	
Cave Valley	0	0	712	712
Coyote Spring Valley	0	1,179	498	1,676
Delamar Valley	0	69	799	868
Dry Lake Valley	0	52	2,571	2,631
Garnet Valley	0	304	0	304
Hamlin Valley	0	0	0	0
Hidden Valley (North)	0	478	0	478
Lake Valley	0	0	804	804
Las Vegas Valley	0	158	0	158
Lower Meadow Valley Wash	0	0	0	0
Pahranagat Valley	0	10	242	252
Snake Valley	0	0	0	0
Spring Valley	79	208	1,922	2,209
Steptoe Valley	86	73	163	322
Total	**166**	**2,531**	**7,710**	**10,414**

Note: The totals may be slightly different than the sum of each row and column due to rounding errors.

Table 3.15-10 shows the length of BLM VRM Classes crossed by the Alternatives E and F pipeline.

Table 3.15-10 Alternatives E and F, Pipeline Centerline Miles by Basin and by VRM Classes

Basins	VRM Classes			Total
	II	III	IV	
Cave Valley	0	0	19	19
Coyote Spring Valley	0	27	13	39
Delamar Valley	0	0	20	20
Dry Lake Valley	0	2	68	70
Garnet Valley	0	7	0	7
Hamlin Valley	0	0	0	0
Hidden Valley (North)	0	12	0	12
Lake Valley	0	0	21	21
Las Vegas Valley	0	6	0	6
Pahranagat Valley	0	0		7
Snake Valley	0	0	0	0
Spring Valley	1	4	50	55
Steptoe Valley	0	0	0	0
Total	**1**	**58**	**197**	**256**

Note: The totals may be slightly different than the sum of each row and column due to rounding errors.

Table 3.15-11 shows the length of BLM VRM Classes crossed by the Alternatives E and F power lines.

Table 3.15-11 Alternatives E and F, Power Lines Crossing Miles by Basin and by VRM Classes

Basins	VRM Classes			Total
	II	III	IV	
Cave Valley	0	0	19	19
Coyote Spring Valley	0	28	11	40
Delamar Valley	0	0	23	23
Dry Lake Valley	0	0	68	68
Garnet Valley	0	2	0	2
Hamlin Valley	0	0	0	0
Hidden Valley (North)	0	12	0	12
Lake Valley	0	0	21	21
Las Vegas Valley	0	0	0	0
Pahranagat Valley	0	0	6	6
Snake Valley	0	0	0	0
Spring Valley	5	7	50	62
Steptoe Valley	7	6	13	27
Total	**12**	**56**	**211**	**278**

Note: The totals may be slightly different than the sum of each row and column due to rounding errors.

Proposed mitigation measures:

- Through the application of additional mitigation measures ROW-VR-1 through ROW-VR-5 (which are not currently addressed in BLM BMPs or SNWA ACMs), Alternative E would meet BLM visual resource objectives overall and meet NPS visual resource objectives in Snake Valley.
- Additional KOP-specific mitigation measures are described in applicable contrast rating forms in order to reduce impacts further (see **Appendix F3.15)**.

Residual impacts include:

- Evidence of change from Alternative E would be seen from high elevations with a maximum view westward in GBNP such as Wheeler Peak, and would not meet the intent of NPS scenery management objectives beyond GBNP boundaries. Views to the north and east of GBNP would meet NPS scenery management objectives because of natural screening, or because no facilities would be located in Snake Valley.

3.15.2.5 Alternative F

Similar to Alternative E, Alternative F was designed to address concerns regarding potential effects from groundwater development in Snake Valley. The same ROW construction and operation types of effects discussed for the Proposed Action would apply to Alternative F, except that ROWs would be granted only within Spring, Cave, Delamar, and Dry Lake Valleys; impacts would not occur in Snake or Hamlin valleys, ancillary facilities would be downsized, and three rather than five pumping stations would be required. Under Alternative F, approximately 10,700 acres would be affected by 263 miles of pipeline and 280 miles of power lines (compared to 306 miles of pipeline, and 323 miles of power lines under the Proposed Action). Impacts to views east of GBNP would be avoided in Alternative F.

Short-term and Long-term Visual Resource Changes within the Rights-of-way and Project Facilities

Short-term effects to the scenic quality and viewer sensitivity of the study area would result from the construction of the pipeline, aboveground facilities, and power lines; project surface disturbance; increased vehicle traffic and increased human presence; and construction-generated dust. Project surface disturbance areas would require vegetation clearing, grading, occupancy, and restoration activities. No changes to scenic quality in Snake or Hamlin valleys would occur.

Facility operation and maintenance would substantially change the long-term character of the landscape in most of the study area, which contains only minor human modification north of Apex. Long-term impacts to visual resources would consist of moderate to strong form, line, color, and texture contrasts of the revegetated pipeline ROW, access roads, transmission lines, and non-linear project components with the existing predominantly natural setting. Periodic vehicle and worker activity associated with operations and maintenance would be visible.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on visual resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Proposed mitigation measures:

- Through the application of additional mitigation measures ROW-VR-1 through ROW-VR-5 (which are not currently addressed in BLM BMPs or SNWA ACMs), Alternative F would meet BLM visual resource objectives overall and meet NPS visual resource objectives in Snake Valley.
- Additional KOP-specific mitigation measures are described in applicable contrast rating forms in order to reduce impacts further (see **Appendix F3.15)**.

Residual impacts include:

- Given climatic constraints on successful revegetation in the study area region, potential visual impacts resulting from changes in woody vegetation in disturbed areas would be visible for a long-term duration until woody vegetation becomes re-established, especially in the linear pipeline/power line ROW.
- While texture and color contrasts might be partially mitigated by using appropriate earth-toned building materials and colors, in general, new buildings, structures, and their shadows would be prominent in the foreground.

Lighting Impacts

Some construction activities would occur during night work shifts. Lighting needed to conduct construction (including drilling and pipeline construction) at night will be limited to the basic requirements to conduct the work. Lighting will be shielded, directed down towards the site and not into surrounding areas or onto roads, and either be manually controlled and used only when occupied or be motion activated if needed for safety and security (ACMs A.11.2 and A.11.3). These protection measures would be moderately effective by limiting the intensity and frequency of project lighting effects. Construction lighting would briefly alter the nighttime viewshed.

When activated, exterior lighting for nighttime safety and security would intermittently alter nighttime light conditions in the study area during project operations as viewed from scenic byways and recreation areas, federal and state highways, as well as specific KOPs. No project lighting effects would occur in Snake Valley.

Proposed mitigation measures:

None.

Residual impacts include:

Project aboveground facility light sources would be seen but would not attract attention, at an intensity less than the typical effects of a single family residence.

Impacts to Sensitive Viewpoints

Construction and long-term impacts would be visible from scenic viewpoints visited by tourists and recreational users within the foreground of scenic byways and recreation and wilderness areas, along those portions of the study area adjacent to federal and state highways, where transmission lines or substations would be visible in the foreground, and where the project crosses roadways. Visibility of Alternative F from scenic byways and recreation areas would be the same as the Proposed Action except that the project would not be visible from KOPs 14, 15 16, 17, 18, 19, 20, 27, 28, and 41.

When combined, these ROW area surface-disturbing activities and nighttime lighting would result in direct visual impacts. The scale of surface-disturbing construction activities, visibility adjacent to federal and state highways and scenic byways, and duration within throughout the construction period would result in short- and long-term visual impacts. These effects would also occur over the operation period, which is of an undetermined duration.

Proposed mitigation measures:

- Application of additional mitigation measures ROW-VR-1 through ROW-VR-5 (which are not currently addressed in BLM BMPs or SNWA ACMs) would reduce visual impacts to sensitive viewpoints of Alternative F.

Residual impacts include:

- Residual impacts (across 280 miles) would be similar to the Proposed Action and Alternatives A through C.

Compliance with Visual Resource Objectives on Public Lands

Compliance with BLM, USFS, NPS, and scenic byway visual resource objectives would be the same as the Proposed Action. The acres of VRM Class II, III, and IV lands impacted by Alternative F are shown in **Tables 3.15-9** through

3.15-11 and would be the same as the Proposed Action in all basins except Snake Valley where no facilities would be constructed. Proposed mitigation measures:

- Through the application of additional mitigation measures ROW-VR-1 through ROW-VR-5 (which are not currently addressed in BLM BMPs or SNWA ACMs), Alternative F would meet BLM visual resource objectives overall and meet NPS visual resource objectives in Snake Valley.
- Additional KOP-specific mitigation measures are described in applicable contrast rating forms in order to reduce impacts further (see **Appendix F3.15)**.

Residual impacts include:

- Evidence of change from Alternative F would be seen from high elevations with a maximum view westward in GBNP such as Wheeler Peak, and would not meet the intent of NPS scenery management objectives beyond GBNP boundaries. Views to the north and east of GBNP would meet NPS scenery management objectives because of natural screening, or because no facilities would be located in Snake Valley.

3.15.2.6 Alignment Options 1 through 4

Impacts for the Alignment Options 1 through 4 are identified in relation to the relevant segment of the Proposed Action in **Table 3.15-12**.

Table 3.15-12 Visual/Aesthetic Resource Impact Summary for Alignment Options 1 through 4

Alignment Option	Analysis
Alignment Option 1 (Humboldt-Toiyabe Power Line Alignment) **Option Description**: Change the locations of a portion of the 230-kV power line from Gonder Substation near Ely to Spring Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	Slightly smaller construction-related area of disturbance due to a reduction in the total length of the ROW corridor (12 miles versus 20 miles). Facilities would be detectable, with perceptible effects of disturbance from three KOPs (23, 24, and 25). USFS and BLM visual objectives would be met. Fewer ROW miles in BLM VRM Classes II (1.2 versus 11.9 miles) and III (55 versus 63.9 miles). Fewer ROW miles as viewed from scenic byways and recreation areas (0.5 mile radius – 21.6 versus 28.8 miles; 4 mile radius – 55.7 versus 65.5 miles). Less overall visual impacts compared to the Proposed Action as Alignment Option 1 would follow an existing transmission corridor and access road through a canyon, whereas the Proposed Action would create a new transmission corridor crossing a forested ridge within view of a scenic byway.
Alignment Option 2 (North Lake Valley Pipcline Alignment) **Option Description**: Change the locations of portions of the mainline pipeline and electrical transmission line in North Lake Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	A larger construction-related area of disturbance. Fewer ROW miles in BLM VRM Class II (10.7 versus 11.9 miles), but more within BLM VRM Class III (86.1 versus 63.9 miles). More ROW miles viewed from scenic byways and recreation areas (0.5 mile radius – 51.6 versus 28.8 miles; 4 mile radius – 83.5 versus 65.5 miles). Greater overall visual impacts compared to the Proposed Action as Alignment Option 2 power line, pumping station, and primary electrical station would be highly visible adjacent to a scenic byway (see simulation for KOP 35 in **Appendix F3.15**).
Alignment Option 3 (Muleshoe Substation and Power Line Alignment) **Option Description**: Eliminate the Gonder to Spring Valley transmission line, and construct a substation with an interconnection with an interstate, high voltage power line in Muleshoe Valley. **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	No impacts to BLM Class II and III lands and scenic byways between Gonder and Spring Valley versus the Proposed Action power line. Fewer ROW miles in BLM VRM Classes II (1.2 versus 11.9 miles) and III (55 versus 63.9 miles). Fewer ROW miles as viewed from scenic byways and recreation areas (0.5 mile radius – 24.4 versus 28.8 miles; 4 mile radius – 46.5 versus 65.5 miles). The Muleshoe Electrical Substation would be colocated with a Pressure Reducing Station, thereby reducing overall visual changes. Less overall visual impacts compared to the Proposed Action as Alignment Option 3 would eliminate 34 miles of power line and access road impacts between Gonder and Spring Valley and 138 kV power lines would replace 230 kV power lines along the main alignment.

Table 3.15-12 Visual/Aesthetic Resource Impact Summary for Alignment Options 1 through 4 (Continued)

Alignment Option	Analysis
Alignment Option 4 (North Delamar Valley Pipeline and Power Line Alignment) **Option Description**: Change the location of a short section of mainline pipeline in Delamar Valley to follow an existing transmission line. **Applicable To**: All alternatives.	Less overall aboveground and surface disturbance visual impacts compared to the Proposed Action as Alignment Option 4 would be located adjacent to an existing transmission line and be approximately 3 miles shorter. Visual effects to U.S. 93 would be increased due to construction of a new pumping station near Highway 93.

3.15.2.7 No Action

Under the No Action Alternative, the proposed GWD Project would not be developed, would not contribute to visual changes, and would not contribute to visual resource cumulative effects in the analysis area. Rural landscapes crossed by the proposed project facilities would likely remain undeveloped and relatively unchanged because the majority of the land is federal. Development within the LCCRDA corridor would affect visual resources in both Lincoln and Clark counties, though potential effects would likely be less noticeable since new development would occur within an existing linear feature on the landscape. Future projects, potentially including energy generation, transmission projects, and commercial/residential development, could occur within the analysis area, depending upon national energy supply and demand and other factors. These future potential projects could alter the visual character of the analysis area, thereby contributing to cumulative effects.

3.15.2.8 Alternative Comparison of Visual Resource Impacts for Construction and Facility Maintenance

A comparison of visual resource impacts is shown in **Table 3.15-13**.

Table 3.15-13 Comparison of Visual Resource Impacts from Proposed Action, Alternatives A through F

Parameter	Proposed Action, Alternatives A through C	Alternative D	Alternatives E and F
Surface Disturbance in VRM Class II Areas (Acres)	166	36	166
Surface Disturbance in VRM Class III Areas (Acres)	2,833	2,251	2,531
Miles of Pipeline Crossing VRM Class II Areas (Miles)	1	1	1
Miles of Pipeline Crossing VRM Class III Areas (Miles)	69	57	58
Miles of Power Lines Crossing VRM Class II Areas (Miles)	12	1	12
Miles of Power Lines Crossing VRM Class III Areas (Miles)	64	43	56
Miles of Power Lines within the Foreground of Scenic Byways (Miles)	28	2	28
Miles of Power Lines within the Middleground of Scenic Byways (Miles)	65	10	65
KOP Contrast Ratings Comply with VRM Class II and III Objectives?	Yes with application of mitigation measures	Yes	Yes with application of mitigation measures

Note: The totals for miles and acreages may be slightly different than presented elsewhere in text due to rounding errors.

3.15.2.9 Groundwater Development and Groundwater Pumping

Issues

The primary visual issues and concerns associated with the construction and operation of the proposed project are the same as the issues identified for the ROWs analysis; the following additional issues are specific to groundwater development:

Groundwater Field Development Construction and Facility Maintenance

- Short-term and long-term visual resource changes resulting from aboveground facilities, power lines, project surface disturbance, and construction-generated dust.
- Impact of potential shielded light sources associated with aboveground facilities.
- Impacts of the project to public viewpoints visited by tourists and recreational users (e.g., GBNP, Humboldt-Toiyabe National Forest, NWRs, scenic byways, and other formal and informal recreational areas).
- Compliance of construction and maintenance of project facilities located on public lands administered by the BLM with visual resource objectives.

Groundwater Pumping

- Potential changes in landscape appearance (primarily valley floors) as the result of groundwater drawdown (due to vegetation transition that would likely occur in wetland/meadow and basin shrubland areas; see Section 3.5, Vegetation Resources).

Assumptions

The assumptions used in the analysis for impacts to visual resources from groundwater development and pumping are the same assumptions that are listed in the analysis for ROWs in Section 3.15.2.1; the following additional issues are specific to groundwater development:

Groundwater Field Development Construction and Facility Maintenance

- The Ely District and Las Vegas RMP management actions and best management practices would be applied to all proposed construction activities, based on the most current RMPs – Ely District 2008; Las Vegas 1998 (BLM 2008, 1998).
- The ACMs included in the SNWA POD to manage surface disturbance effects for ROWs provide a basis for appropriate measures that may be submitted in future SNWA ROW applications. For purposes of impact analysis, it has been assumed that measures appropriate for ROW construction would be applied to ROW construction in groundwater development areas.

Groundwater Pumping

- Assumptions about the potential changes in water dependent resources from groundwater pumping do not incorporate additional assumptions about the effects of climate change because specific long term effects of climate change are not presently known, and the incremental contribution of climate change effects to project effects cannot be reasonably estimated. A general discussion of climate change effects is provided in Section 3.1, Air and Atmospheric Values.

Methodology for Analysis

- The methods outlined under ROWs were applied to project surface development activities.
- Where it is determined that vegetation on valley floors could decline due to groundwater pumping (see Section 3.5, Vegetation Resources), the change in landscape appearance was estimated and compared to visual resource objectives for compliance. The types of impacts are described in general terms with impact indicators. Where BLM BMPs and SNWA ACMs may not adequately reduce impacts, additional mitigation recommendations, and avoidance criteria are provided.

- Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.
- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect visual resources from ROW construction and operation activities.

3.15.2.10 Proposed Action

Groundwater Development Area

Future site-specific impact assessments will assess visual impacts for specific project facilities in detail as the locations of facilities become better defined.

Short-term and Long-term Visual Resource Changes Resulting From Construction and Operation of Aboveground Facilities

As described in Chapter 2, Section 2.5, a total of 174 groundwater wells could be constructed under the Proposed Action with between 10 and 93 planned in each of the 5 hydrologic basins including: Spring Valley (75 to 93 wells), Snake Valley (39 to 48 wells), Cave Valley (10 to 11 wells), Dry Lake Valley (10 to 11 wells), and Delamar Valley (10 to 11 wells).

Well drilling is anticipated to last approximately 30 days per well. Construction of all well sites proposed under the project could take 20 or more years to complete, though specific projects would likely be completed intermittently during this time frame (i.e., construction would not be constant over a 20-year period). Wells are also assumed to be located at least 1 mile apart, and may be clustered in well fields of grids up to 4 wells. Visible grading for each well site would require a 1.5 acre permanent ROW with an additional 0.5 acre temporary construction ROW. Visible well site components within the well pad would consist of an aboveground well housing that would be constructed from concrete blocks. Even with the anticipated construction time frame, all construction-related visual resource impacts are considered short term; there would be no long-term construction-related impacts to visual resources in the study area.

Major construction activities associated with the groundwater development areas would likely include vegetation disturbance and removal, road building or upgrading, and development of well sites (drilling of the well and construction of associated well housing). These activities are similar to those described under ROWs above, except with smaller power lines, pipeline ROWs, and new wells. In general, construction in the groundwater development areas would also introduce visual contrasts similar to those previously described for ROWs, as well as a relatively high degree of human activity compared to the current conditions. Impacts are dependent on the location and visibility of roads and well pads in relation to the volume and sensitivity of viewers. In general, the magnitude of visual impacts would be greater in those basins with a higher number of proposed groundwater production wells (Spring and Snake valleys) compared to those with fewer proposed wells (Delamar, Dry Lake, and Cave valleys).

The construction activities would require work crews, vehicles, and equipment that would temporarily add to the visual impacts associated with construction of the proposed project, similar to those described under ROWs above, except with smaller power lines, pipeline ROWs, and new wells. Increased vehicle traffic for worker and staff access and large construction equipment (e.g., trucks, excavators, cranes) would be expected during construction, as well as future operations and maintenance activities. Increased traffic would produce visible activity and dust from disturbance of dry soils, impairing viewing distances and coating vegetation. Suspension and visibility of dust would be influenced by the number of vehicles, speed, road surface materials, and weather conditions (see Section 3.1, Air and Atmospheric Values). Additionally, construction materials would be visible during construction.

The following long-term components of the Proposed Action would permanently modify visual resources:

- Up to 174 permanent, graded wellpad ROWs of 1.5 acres each;
- Well housings on each wellpad constructed of concrete block;
- Revegetation of up to 2,874 acres of temporary ROWs adjacent to each wellpad;
- Revegetation and maintenance of up to 5,536 acres of permanent ROWs;
- Up to 351 miles of existing, new, or improved access roads to each wellpad located within the collector pipeline ROWs;
- Up to 434 miles of aboveground 25 kV power lines, with 50 feet of permanent ROW;
- Up to 434 miles of collector pipelines ranging from 10 inches to 30 inches in diameter;
- Up to 145 staging areas of 1 acre each;
- Five secondary substations to reduce power from 69 to 25 kV;
- Three hydroturbine energy recovery facilities;
- Two future pumping stations to convey water into the main and lateral pipelines, approximately 5 acres each of permanent and temporary ROW; and
- Communication facilities and fiber optic cables (installed underground) along access roads and on wellpads.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on visual resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

In its ACMs, Appendix E of the POD (SNWA 2011), SNWA would implement its ROW ACMs to future ROWs including production wells, collector pipelines, and associated facilities; locate collector pipelines, distribution power lines, and secondary substations along existing roads or other utility alignments, as feasible, which would reduce landscape fragmentation (ACM B.1.3); paint or use colored block to blend well housings with the colors of the surrounding landscape (ACM B.1.4); and minimize nighttime lighting (ACM B.1.4).

Long-term surface disturbance impacts would be similar to ROW area impacts described above, but the scale of power lines and collector pipelines would result in smaller disturbance areas. Since the well housings generally would have low profiles (i.e., only 1 story/10 feet high), visual impacts from surface disturbance would largely be screened by the average height of vegetation (2 to 5 feet) when viewed from lower elevations. When viewed from higher elevations, the well pads would appear as geometric squares and the access roads as linear ribbons, in a grid-like pattern of roads and wellpads on a homogeneous valley floor where not colocated along existing roads and other utility alignments. Cut and fill required for wellpads on slopes above 5 percent would attract attention within the foreground-middleground. New aboveground power lines would have similar effects as those described for ROWs; they would be apparent in the foreground, and would increase the contrast of access roads and collector pipelines.

Within the groundwater development areas, periodic vehicle and worker activity would be expected for operations and maintenance purposes. The frequency would be less than during construction. Except during periods of major maintenance, temporary visual impacts similar to those described under construction impacts above would be anticipated.

Lighting Impacts

Short-term and long-term lighting impacts would be similar to ROWs described above.

Impacts to Sensitive Viewpoints

Construction and long-term impacts would be visible from scenic viewpoints visited by tourists and recreational users within the foreground of scenic byways and recreation and wilderness areas, adjacent to federal and state highways,

where distribution power lines or substations would be visible in the foreground, and where the project crosses roadways.

Compliance with Visual Resource Objectives

Most of the groundwater development areas are located in VRM Class III and IV areas and generally construction activities are considered consistent with these VRM classes. As identified in **Table 3.15-14**, a portion of the proposed groundwater development actions are located in VRM Class II areas, particularly in the Cave, Dry Lake, Snake, and Spring valleys. As described in Chapter 2, a small fraction of the groundwater development areas would be reserved for temporary and permanent ROWs. Construction activities in these areas would likely be seen and attract the attention of observers at KOPs, creating potential short-term conflicts with VRM Class II objectives.

Table 3.15-14 Groundwater Development Areas within BLM VRM Classes (Acres), Proposed Action

VRM Classes	Cave Valley	Delamar Valley	Dry Lake Valley	Snake Valley	Spring Valley	Total
II	5,912	0	3,486	474	13,536	23,409
III	819	41,877	50,398	41,368	247,636	382,098
IV	28,056	29,611	114,877	50,318	100,199	323,061
Grand Total	34,787	71,488	168,761	92,160	361,371	728,568

Note: Only a fraction of the groundwater development areas would be reserved for future facilities.
The totals may be slightly different than the sum of each row and column due to rounding errors.

Groundwater production wells generally are considered consistent with the visual resource goals of VRM Classes III and IV (see Section 3.15.1, Affected Environment) with application of BLM BMPs, except from elevated locations where a maximum view of facilities within a basin occurs. Effects would be most apparent in Spring Valley and Snake valleys where the majority of facilities would be located. In areas classified as VRM II, unmitigated production wells would constitute an impact concern for visual resources.

Groundwater development activities would be visible primarily from trails and roads located along the Snake Range divide and the upper slopes of the range. Snake Valley groundwater facilities (ROWs, well pads) are estimated to be located 10 miles or more (measured horizontally) from the Mt. Wheeler summit viewing areas in GBNP. Spring Valley groundwater facilities could be viewed as close as 3 miles (measured horizontally) from the Mt. Wheeler summit viewing area.

Other GBNP facilities are located on north-facing slopes or in drainages and canyons with enclosed viewsheds and would not be affected by views of groundwater development activities. Groundwater development activities in the Spring and Snake valleys (these are outside of the GBNP boundary) would not meet the intent of NPS scenery management objectives beyond GBNP boundaries.

Groundwater development activities may not be consistent with BLM visual resource objectives in those portions of Spring (13,539 acres), Snake (474 acres), Cave (5,912 acres), and Dry Lake (3,486 acres) valleys classified as VRM Class II, unless sited and screened from view. Long-term surface disturbance impacts would be similar to ROW area impacts described above, but the scale of power lines and collector pipelines would result in smaller disturbance areas. Since the well housings generally would have low profiles (i.e., only 1 story/10 feet high), visual impacts from surface disturbance would largely be screened by the average height of vegetation (2 to 5 feet) when viewed from lower elevations. When viewed from higher elevations, the well pads would appear as geometric squares and the access roads as linear ribbons, forming a grid-like pattern of roads and wellpads on a homogeneous valley floor. Cut and fill required for wellpads on slopes above 5 percent would attract attention within the foreground-middleground. New aboveground power lines would be apparent in the foreground and increase the contrast of access roads. In general, buildings and structures would contrast moderately to strongly in form, line, color, and texture with the existing and generally natural landscape.

Conclusion. Development of the groundwater development areas would change the visual setting in the study area subsequent to, and in addition to, the action alternatives for the proposed ROW facilities. Impacts from construction, operations, and maintenance are dependent on the location and visibility of future facilities in relation to the volume

and sensitivity of viewers. Development of up to 174 well sites would affect the overall visual landscape in each of the 5 hydrologic basins. Changes in visual characteristics due to vegetation disturbance, removal and the re-establishment of woody vegetation would persist for more than 5 years over 5,536 acres of permanent ROW, 2,874 acres of temporary ROW, and up to 145 staging areas. Increased vehicle traffic for worker access and large construction equipment (e.g., trucks, excavators, cranes, etc.) would be expected during construction. Increased vehicle traffic from worker access and movement of construction equipment would produce visible activity and dust from soil disturbance, which would impair viewing distances and coat vegetation.

It is assumed that SNWA would implement ROW ACMs, including its commitment to locate collector pipelines, distribution power lines, and secondary substations along existing roads or other utility alignments to use VRM compatible paint and materials for aboveground structures, and to minimize nighttime lighting. Further, in future site-specific NEPA analyses, SNWA would implement additional mitigation recommendations to: 1) avoid locating groundwater production wells on slopes greater than 5 percent; 2) bury distribution power lines; 3) utilize terrain and distance to screen groundwater development facilities from sensitive viewpoints; and 4) avoid siting facilities in BLM VRM Class I and II areas. Assuming implementation of these measures, it is expected that groundwater field development construction and facility maintenance would meet VRM Class objectives.

Proposed mitigation measures:

GW-VR-1: Avoid Siting Facilities on Slopes. Where determined necessary by BLM for visual resource protection, groundwater development facilities would not be located on slopes greater than 5 percent. Effectiveness: Siting facilities in areas that avoid creating cut and fill slopes would be effective in reducing or avoiding visual impacts and decrease the magnitude of landscape fragmentation. Effects on other resources: None.

GW–VR-2: Install Distribution Power Lines Underground. Where determined necessary by BLM for visual resource protection reasons, distribution power lines (voltages less than 33 kV) would be placed underground, when not located within high voltage transmission corridors. Underground power lines can be located within the 100-foot ROW with a minimum separation in accordance with the National Electric Safety Code Standard 353. Underground power lines should be located within the disturbed area of the permanent ROW to minimize soil disturbance and visual contrasts to the extent feasible. Effectiveness: Undergrounding distribution power lines would completely eliminate aboveground power line visual impacts as distribution level voltages account for all of the power lines in the groundwater development areas. The need to underground distribution power lines located outside of disturbance areas would be determined with BLM as a line of soil disturbance and vegetation removal would result from grading of the power line ROW. Effects on other resources: Application would result in beneficial effects to vegetation, avian species, and some wildlife. There would be no implementation effects from this measure, if underground power lines are located within other disturbed project areas. Where located outside of disturbance areas, there would be increased effects to vegetation, wildlife, and soils until vegetation has been re-established. In general, groundwater buildings and structures would contrast moderately to strongly contrast in form, line, color, and texture with the existing and generally natural landscape due to the built structures' rectilinear geometry, symmetry, and surface characteristics.

GW-VR-3: Site Wellfield Facilities away from Designated Viewing Locations. Where determined necessary by BLM for visual resource protection reasons, site groundwater development production wells, staging areas, and pumping stations more than 0.5 mile from designated viewing locations with high viewer sensitivity (e.g., scenic byways, KOPs, wilderness areas and national parks) except where they are within the temporary and permanent ROW for the main or lateral pipelines or colocated with ROW facilities. Utilize terrain to screen groundwater development facilities and avoid placing buildings on high land features and along "skylines" to conceal or reduce changes. Effectiveness: This measure would be effective. Siting facilities in areas that utilize terrain and vegetation screening or that locate structures and facilities more than 0.5 mile from designated viewing locations would mitigate visual impacts. Proposed facilities would be less visible from viewpoints with high viewer sensitivity or high use volumes, but would remain visible for other viewers. Effects on other resources: None.

GW-VR-4: Site Groundwater Development Structures and Facilities in BLM VRM Class III or IV Areas. No well pads or roads would be constructed in Class I and II areas. Effectiveness: Siting facilities to avoid VRM Class II areas would be effective in minimizing visual impacts from sensitive viewpoints. VRM Class II areas account for nearly 24,000 acres or approximately 3 percent of the potential groundwater development area. Compatibility with VRM objectives would be determined in subsequent NEPA documents. Effects on other resources: None.

Potential residual impacts include:

- The open, flat, and homogeneous nature of valley floors has a low visual absorption capacity to change. Long-term visual impacts would be greater in basins with a higher number of proposed groundwater production wells (e.g., Spring and Snake valleys) compared to those with fewer proposed wells (e.g., Delamar, Dry Lake, and Cave valleys). Well housings, and up to 434 miles of pipelines and 25 kV power lines in each of the five hydrologic basins would permanently modify visual resources in the study area by creating moderate to strong contrasts in form, line, color, and texture with the existing natural landscape. Periodic vehicle and worker activity associated with operations and maintenance would be visible and produce dust on unimproved roads.
- Groundwater development activities in the Spring and Snake valleys would not meet the intent of NPS scenery management objectives beyond GBNP boundaries.

Groundwater Pumping

Potential Changes in Landscape Appearance from Groundwater Drawdown Effects on Vegetation

The incremental expansion of the Proposed Action groundwater drawdown area over time in relation to the wetland and basin shrubland cover types, potentially affected springs, and potentially affected perennial stream segments is summarized in Section 3.5, Vegetation Resources and **Figure 3.5-6**. There are no criteria regarding the effects of groundwater drawdown on the vegetation communities that characterize the study area to assist in making a determination of impacts that are incompatible with BLM VRM Class II and III objectives. Site-specific effects to vegetation from groundwater drawdown and compliance with management objectives would be addressed through subsequent NEPA analyses.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on visual resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

SNWA ACMs and stipulated agreements for Spring, Delamar, Dry Lake, and Cave valleys propose several broad measures to minimize groundwater pumping effects on vegetation. GW-VEG-3, described in Section 3.5, Vegetation Resources, specifies a Monitoring, Mitigation, and Management Plan for Snake Valley that includes monitoring measures for vegetation community composition and distribution. These measures also would reduce effects on visual resources.

Conclusion. Drawdown of groundwater would potentially dry out the soil moisture profile of ET area vegetation (wetland/meadow, basin shrubland), and vegetation dependent on spring flows. Drawdown induced root zone stress may result in broad scale vegetation composition changes at various locations across the landscape. It is expected that the overall pattern and form of native vegetation communities within the landscape would remain similar over time. Because these vegetation composition changes would proceed slowly, it is unlikely that most public viewers (primarily highway travelers and dispersed recreational users) would recognize a change in vegetation community appearance as a distinct contrast relative to the surrounding landscape. On a more site-specific scale, valley residents (ranchers and farmers), and tribal members who visit traditional use areas may recognize changes in vegetation communities over time because of long term familiarity with specific landscape features such as springs, and frequent visits to these types of sites.

Proposed monitoring measure:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

As described in Water Resources Section 3.3.2, water resources mitigation measure GW-WR-7 would assist in avoiding or minimizing impacts to federal resources and federal water rights. Implementation of this measure would reduce potential effects to hydric soils associated with locations where federal water rights or federal water dependant

resources are mitigated. Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As described in Water Resources Section 3.3.2, GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights) would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements. (See Water Resources section 3.3.2 for complete wording of GW-WR-7).

Potential residual impacts include:

- The COM Plan, ACMs, and water resources monitoring and mitigation measures could be effective in reducing impacts to landscape appearance. Gradual and subtle changes in vegetation community composition and appearance may occur over long periods of time. The ability to recognize these changes would vary by the relative experience of the viewer with the landscapes affected. One relevant objective of the COM Plan to landscape appearance is to avoid and minimize impacts to water-dependent ecosystems and associated components. Long-term drying of soils may permanently reduce the ability of these soils to support vegetation. It is not possible to determine the level of impact at this time. Residual effects on landscape appearance could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to landscape appearance could occur at some locations.

3.15.2.11 Alternative A

Groundwater Development Area

Development of the groundwater development areas would result in a permanently changed visual setting in the study area subsequent to, and in addition to, the action alternatives for the proposed ROW facilities. Impacts from construction, operations, and maintenance are dependent on the location and visibility of future facilities in relation to the volume and sensitivity of viewers, and will be addressed through future site-specific impact assessments. Development of up to 117 well sites would affect the overall visual landscape in each of the 5 hydrologic basins. Changes in visual characteristics due to vegetation disturbance, removal, and the re-establishment of woody vegetation would persist for more than 5 years over 3,171 acres of permanent ROW, 1,643 acres of temporary ROW, and up to 82 staging areas. Long-term visual impacts would be greater in basins with a higher number of proposed groundwater production wells (e.g., Spring and Snake valleys) compared to those with fewer proposed wells (e.g., Delamar, Dry Lake, and Cave valleys). Up to 246 miles of pipelines and 25-kV power lines in each of the five hydrologic basins would permanently modify visual resources in the study area by creating moderate to strong contrasts in form, line, color, and texture with the existing natural landscape. It is assumed that SNWA would implement its ROW ACMs, including its commitment to locate colector pipelines, distribution power lines, and secondary substations along existing roads or other utility alignments, use VRM compatible paint and materials for aboveground structures, and minimize nighttime lighting. Further, in future site-specific NEPA analyses, SNWA would implement additional mitigation recommendations to: 1) avoid locating groundwater production wells on slopes greater than 5 percent; 2) bury distribution power lines in sensitive viewing situations; 3) utilize terrain and distance to screen groundwater development facilities from sensitive viewpoints; and 4) avoid siting facilities in BLM VRM Class I and II areas. Based on these measures, it is expected that groundwater field development construction and facility maintenance would meet VRM Class objectives.

Proposed mitigation measures:

Same as the Proposed Action.

Potential residual impacts include:

Same as the Proposed Action.

Groundwater Pumping

The effects of drawdown of groundwater under Alternative A would be less than the Proposed Action, but would still potentially dry out the soil moisture profile, creating a drawdown-induced root zone stress that would change the composition of existing vegetation. Pumping would occur in five basins at distributed locations. The potential responses by viewers to gradual changes in vegetation communities are the same as those described for the Proposed Action.

Conclusion. The Proposed Action conclusion would apply to this alternative.

Proposed monitoring measure:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

As described in Water Resources Section 3.3.2, water resources mitigation measure GW-WR-7 would assist in avoiding or minimizing impacts to federal resources and federal water rights. Implementation of this measure would reduce potential effects to hydric soils associated with locations where federal water rights or federal water dependant resources are mitigated. Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As described in Water Resources Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements. (See Water Resources section 3.3.2 for complete wording of GW-WR-7).

Potential residual impacts include:

- The COM Plan, ACMs, and water resources monitoring and mitigation measures could be effective in reducing impacts to landscape appearance. Gradual and subtle changes in vegetation community composition and appearance may occur over long periods of time. The ability to recognize these changes would vary by the relative experience of the viewer with the landscapes affected. One relevant objective of the COM Plan to landscape appearance is to avoid and minimize impacts to water-dependent ecosystems and associated components. Long-term drying of soils may permanently reduce the ability of these soils to support vegetation. It is not possible to determine the level of impact at this time. Residual effects on landscape appearance could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to landscape appearance could occur at some locations.

3.15.2.12 Alternative B

Groundwater Development Area

Development of the groundwater development areas would result in a permanently changed visual setting around points of diversion in five basins subsequent to, and in addition to, the action alternatives for the proposed ROW facilities. Impacts from construction, operations, and maintenance are dependent on the location and visibility of future facilities in relation to the volume and sensitivity of viewers and will be addressed through future site-specific impact assessments. Development of up to 136 well sites would affect the overall visual landscape in each of the 5 hydrologic basins. Changes in visual characteristics due to vegetation disturbance, removal and the re-establishment of woody vegetation would persist for more than 5 years over 3,077 acres of permanent ROW, 1,587 acres of temporary ROW, and up to 79 staging areas. Long-term visual impacts would be greater in basins with a higher number of proposed groundwater production wells (e.g., Spring and Snake valleys) compared to those with fewer proposed wells (e.g., Delamar, Dry Lake, and Cave valleys). Up to 236 miles of pipelines and 25-kV power lines in each of the 5 hydrologic basins would permanently modify visual resources in the study area by creating moderate to strong contrasts in form, line, color, and texture with the existing natural landscape. It is assumed that SNWA would implement its ROW ACMs, including its commitment to locate collector pipelines, distribution power lines, and secondary substations along existing roads or other utility alignments, use VRM compatible paint and materials for aboveground structures, and minimize nighttime lighting. Further, in future site-specific NEPA analyses, SNWA would implement additional mitigation recommendations to: 1) avoid locating groundwater production wells on slopes greater than 5 percent; 2) bury distribution power lines; 3) utilize terrain and distance to screen groundwater development facilities from sensitive viewpoints; and 4) avoid siting facilities in BLM VRM Class I and II areas. Based on these measures, it is expected that groundwater field development construction and facility maintenance would meet VRM Class objectives.

Proposed mitigation measures:

Same as the Proposed Action.

Potential residual impacts include:

Same as the Proposed Action.

Groundwater Pumping

The effects of groundwater drawdown on vegetation under Alternative B would be similar to the Proposed Action. The potential responses by viewers to gradual changes in vegetation communities are the same as those described for the Proposed Action.

Conclusion. The Proposed Action conclusion would apply to this alternative.

Proposed monitoring measure:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

As described in Water Resources Section 3.3.2, water resources mitigation measure GW-WR-7 would assist in avoiding or minimizing impacts to federal resources and federal water rights. Implementation of this measure would reduce potential effects to hydric soils associated with locations where federal water rights or federal water dependant resources are mitigated. Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As described in Water Resources Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action

involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources section 3.3.2 for complete wording of GW-WR-7).

Potential residual impacts include:

- The COM Plan, ACMs, and water resources monitoring and mitigation measures could be effective in reducing impacts to landscape appearance. Gradual and subtle changes in vegetation community composition and appearance may occur over long periods of time. The ability to recognize these changes would vary by the relative experience of the viewer with the landscapes affected. One relevant objective of the COM Plan to landscape appearance is to avoid and minimize impacts to water-dependent ecosystems and associated components. Long-term drying of soils may permanently reduce the ability of these soils to support vegetation. It is not possible to determine the level of impact at this time. Residual effects on landscape appearance could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to landscape appearance could occur at some locations.

3.15.2.13 Alternative C

Groundwater Development Area

Development of the groundwater development areas would result in a permanently changed visual setting in the study area subsequent to, and in addition to, the action alternatives for the proposed ROW facilities. Impacts from construction, operations, and maintenance are dependent on the location and visibility of future facilities in relation to the volume and sensitivity of viewers, and will be addressed through future site-specific impact assessments. Development of up to 117 well sites would affect the overall visual landscape in each of the 5 hydrologic basins. Changes in visual characteristics due to vegetation disturbance, removal, and the re-establishment of woody vegetation would persist for more than 5 years over 3,171 acres of permanent ROW, 1,643 acres of temporary ROW, and up to 82 staging areas. Long-term visual impacts would be greater in basins with a higher number of proposed groundwater production wells (e.g., Spring and Snake valleys) compared to those with fewer proposed wells (e.g., Delamar, Dry Lake, and Cave valleys). Up to 246 miles of pipelines and 25-kV power lines in each of the 5 hydrologic basins would permanently modify visual resources in the study area by creating moderate to strong contrasts in form, line, color, and texture with the existing natural landscape.

Proposed mitigation measures:

Same as the Proposed Action.

Potential residual impacts include:

Same as the Proposed Action.

Groundwater Pumping

The effects of groundwater drawdown on vegetation under Alternative C would be similar in type, but less than the acres of vegetation affected by the Proposed Action. The potential responses by viewers to gradual changes in vegetation communities are the same as those described for the Proposed Action.

Conclusion. The Proposed Action conclusion would apply to this alternative.

Proposed monitoring measure:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

As described in Water Resources Section 3.3.2, water resources mitigation measure GW-WR-7 would assist in avoiding or minimizing impacts to federal resources and federal water rights. Implementation of this measure would reduce potential effects to hydric soils associated with locations where federal water rights or federal water dependant resources are mitigated. Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As described in Water Resources Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources section 3.3.2 for complete wording of GW-WR-7).

Potential residual impacts include:

- The COM Plan, ACMs, and water resources monitoring and mitigation measures could be effective in reducing impacts to landscape appearance. Gradual and subtle changes in vegetation community composition and appearance may occur over long periods of time. The ability to recognize these changes would vary by the relative experience of the viewer with the landscapes affected. One relevant objective of the COM Plan to landscape appearance is to avoid and minimize impacts to water-dependent ecosystems and associated components. Long-term drying of soils may permanently reduce the ability of these soils to support vegetation. It is not possible to determine the level of impact at this time. Residual effects on landscape appearance could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to landscape appearance could occur at some locations.

3.15.2.14 Alternative D

Groundwater Development Area

Development of the groundwater development areas would result in similar construction and operation effects as discussed for the Proposed Action, except that impacts would not occur in White Pine County. Impacts from construction, operations, and maintenance are dependent on the location and visibility of future facilities in relation to the characteristic landscape and the volume and sensitivity of viewers and would be addressed through future site-specific impact assessments.

Conclusion. Development of up to 83 well sites would affect the overall visual landscape in each of the 4 hydrologic basins. Changes in visual characteristics due to vegetation disturbance, removal, and the re-establishment of woody vegetation would persist for more than 5 years over 2,635 acres of permanent ROW, 1,370 acres of temporary ROW, and up to 69 staging areas. Up to 206 miles of pipelines and 25-kV power lines in each of the 5 hydrologic basins would permanently modify visual resources in the study area by creating moderate to strong contrasts in form, line, color, and texture with the existing natural landscape. Evidence of changes in views from GBNP would be avoided in Alternative D.

Proposed mitigation measures:

None.

Potential residual impacts include:

- The open, flat, and homogeneous nature of valley floors has a low visual absorption capacity to change. Long-term visual impacts would be greater in basins with a higher number of proposed groundwater production wells (e.g., Spring Valley) compared to those with fewer proposed wells (e.g., Delamar, Dry Lake, and Cave valleys). Well housings and up to 206 miles of pipelines and 25 kV power lines in each of the 4 hydrologic basins would permanently modify visual resources in the study area by creating moderate to strong contrasts in form, line, color, and texture with the existing natural landscape. Periodic vehicle and worker activity associated with operations and maintenance would be visible and produce dust on unimproved roads.

Groundwater Pumping

The effects of drawdown of groundwater under Alternative D would be less than the Proposed Action. The potential responses by viewers to gradual changes in vegetation communities on the same as those described for the Proposed Action.

Conclusion. The Proposed Action conclusion would apply to this alternative.

Proposed monitoring measure:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

Proposed mitigation measures:

As described in Water Resources Section 3.3.2, water resources mitigation measure GW-WR-7 would assist in avoiding or minimizing impacts to federal resources and federal water rights. Implementation of this measure would reduce potential effects to hydric soils associated with locations where federal water rights or federal water dependant resources are mitigated. Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As described in Water Resources Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Potential residual impacts include:

- The COM Plan, ACMs, and water resources monitoring and mitigation measures could be effective in reducing impacts to landscape appearance. Gradual and subtle changes in vegetation community composition and appearance may occur over long periods of time. The ability to recognize these changes would vary by the relative experience of the viewer with the landscapes affected. One relevant objective of the COM Plan to landscape appearance is to avoid and minimize impacts to water-dependent ecosystems and associated components. Long-term drying of soils may permanently reduce the ability of these soils to support vegetation. It is not possible to

determine the level of impact at this time. Residual effects on landscape appearance could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to landscape appearance could occur at some locations.

3.15.2.15 Alternative E

Groundwater Development Area

Development of the groundwater development areas would result in similar construction and operation types of effects discussed for Alternative D except that impacts would not occur in the portion of Snake Valley in White Pine County, and would be limited to Spring, Delamar, Dry Lake, and Cave valleys. Impacts from construction, operations, and maintenance are dependent on the location and visibility of future facilities in relation to the volume and sensitivity of viewers, and would be addressed through future site-specific impact assessments.

Conclusion. Development of up to 83 well sites would affect the overall visual landscape in each of the 4 hydrologic basins. Changes in visual characteristics due to vegetation disturbance, removal, and the re-establishment of woody vegetation would persist for more than 5 years over 2,683 acres of permanent ROW, 1,396 acres of temporary ROW, and up to 70 staging areas. Up to 210 miles of pipelines and 25 kV power lines in each of the 4 hydrologic basins would permanently modify visual resources in the study area by creating moderate to strong contrasts in form, line, color, and texture with the existing natural landscape. Long-term visual impacts would be greatest in Spring Valley as it would contain a higher number of proposed groundwater production wells compared to Delamar, Dry Lake, and Cave valleys.

Proposed mitigation measures:

None.

Potential residual impacts include:

The open, flat, and homogeneous nature of valley floors has a low visual absorption capacity to change. Long-term visual impacts would be greater in basins with a higher number of proposed groundwater production wells (e.g., Spring Valley) compared to those with fewer proposed wells (e.g., Delamar, Dry Lake, and Cave valleys). Well housings and up to 210 miles of pipelines and 25 kV power lines in each of the four hydrologic basins would permanently modify visual resources in the study area by creating moderate to strong contrasts in form, line, color, and texture with the existing natural landscape. Periodic vehicle and worker activity associated with operations and maintenance would be visible and produce dust on unimproved roads. No facilities would be located in proximity to GBNP in Snake Valley.

Groundwater Pumping

The effects of drawdown of groundwater under Alternative E would be less than the Proposed Action. The potential responses by viewers to gradual changes in vegetation communities are the same as those described for the Proposed Action.

Conclusion. The Proposed Action conclusion would apply to this alternative.

Proposed monitoring measure:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

Proposed mitigation measures:

As described in Water Resources, Section 3.3.2, water resources mitigation measure GW-WR-7 would assist in avoiding or minimizing impacts to federal resources and federal water rights. Implementation of this measure would reduce potential effects to hydric soils associated with locations where federal water rights or federal water dependant

resources are mitigated. Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources Section 3.3, for complete wording of GW-WR-7).

Potential residual impacts include:

- The COM Plan, ACMs, and water resources monitoring and mitigation measures could be effective in reducing impacts to landscape appearance. Gradual and subtle changes in vegetation community composition and appearance may occur over long periods of time. The ability to recognize these changes would vary by the relative experience of the viewer with the landscapes affected. One relevant objective of the COM Plan to landscape appearance is to avoid and minimize impacts to water-dependent ecosystems and associated components. Long-term drying of soils may permanently reduce the ability of these soils to support vegetation. It is not possible to determine the level of impact at this time. Residual effects on landscape appearance could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to landscape appearance could occur at some locations.

3.15.2.16 Alternative F

Groundwater Development Area

Alternative F would exclude groundwater development from Snake Valley. Alternative F is similar to Alternatives D and E, except that groundwater development in all the remaining project basins, including Spring Valley, would be spatially distributed as described for the Proposed Action. Impacts from construction, operations, and maintenance are dependent on the location and visibility of future facilities in relation to the volume and sensitivity of viewers, and would be addressed through future site-specific impact assessments.

Conclusion. Development of up to 117 well sites would affect the overall visual landscape in each of the 4 hydrologic basins. Changes in visual characteristics due to vegetation disturbance, removal and the re-establishment of woody vegetation would persist for more than 5 years over 4,359 acres of permanent ROW, 2,270 acres of temporary ROW, and up to 115 staging areas. Up to 344 miles of pipelines and 25 kV power lines in each of the 4 hydrologic basins would permanently modify visual resources in the study area by creating moderate to strong contrasts in form, line, color, and texture with the existing natural landscape. Long-term visual impacts would be greatest in Spring Valley as it would contain a higher number of proposed groundwater production wells compared to Delamar, Dry Lake, and Cave valleys.

Proposed mitigation measures:

None.

Potential residual impacts include:

The open, flat, and homogeneous nature of valley floors has a low visual absorption capacity to change. Long-term visual impacts would be greater in basins with a higher number of proposed groundwater production wells (e.g., Spring Valley) compared to those with fewer proposed wells (e.g., Delamar, Dry Lake, and Cave valleys). Well housings, and up to 332 miles of pipelines and 25 kV power lines in each of the 4 hydrologic basins would permanently modify visual resources in the study area by creating moderate to strong contrasts in form, line, color, and texture with the existing

natural landscape. Periodic vehicle and worker activity associated with operations and maintenance would be visible and produce dust on unimproved roads. No facilities would be located in Snake Valley in proximity to GBNP.

Groundwater Pumping

The effects of drawdown of groundwater under Alternative F would be less than the Proposed Action. The potential responses by viewers to gradual changes in vegetation communities are the same as those described for the Proposed Action

Conclusion. The Proposed Action conclusion would apply to this alternative.

Proposed monitoring measure:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3, for complete wording of GW-WR-3a).

Proposed mitigation measures:

As described in Water Resources, Section 3.3.2, water resources mitigation measure GW-WR-7 would assist in avoiding or minimizing impacts to federal resources and federal water rights. Implementation of this measure would reduce potential effects to hydric soils associated with locations where federal water rights or federal water dependant resources are mitigated. Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources Section 3.3, for complete wording of GW-WR-7).

Potential residual impacts include:

- The COM Plan, ACMs, and water resources monitoring and mitigation measures could be effective in reducing impacts to landscape appearance. Gradual and subtle changes in vegetation community composition and appearance may occur over long periods of time. The ability to recognize these changes would vary by the relative experience of the viewer with the landscapes affected. One relevant objective of the COM Plan to landscape appearance is to avoid and minimize impacts to water-dependent ecosystems and associated components. Long-term drying of soils may permanently reduce the ability of these soils to support vegetation. It is not possible to determine the level of impact at this time. Residual effects on landscape appearance could exist considering the potential long recovery period that could occur. Some unavoidable adverse impacts to landscape appearance could occur at some locations.

3.15.2.17 No Action

Groundwater Development Area

Under the No Action Alternative, the proposed groundwater field development construction and facility maintenance would not occur, would not contribute to visual changes, and would not contribute to visual resource cumulative effects in the analysis area. Groundwater field development by existing and approved projects would continue.

Groundwater Pumping

Based on the hydrologic model analysis for this EIS, groundwater pumping under the No Action Alternative could affect surface water sources in 8 to 19 basins. As indicated by the number of springs or perennial streams located within the 10-foot groundwater drawdown contour, most of the effects could occur in the following valleys: Dry Lake, Lake, Panaca, Lower Meadow Valley, Wash, Patterson, and Clover. Wetland/meadows and basin shrubland shrub vegetation associated with the surface water sources could be altered in terms of composition and density. As a result, gradual and subtle effects on views of the landscape could become evident, as a result of composition changes in these vegetation communities.

3.15.2.18 Alternatives Comparison

Comparisons of visual resource impacts for groundwater development and pumping are shown in **Table 3.15-15**.

Table 3.15-15 Comparison of Visual Resource Impacts for Groundwater Development and Pumping, Proposed Action and Alternatives A through F

Parameter	Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Groundwater Field Construction and Facility Maintenance							
Basins Affected by Aboveground Facilities	5	5	5	5	4	4	4
Groundwater Development Areas in VRM Class II (acres)	23,409	23,409	23,409	23,409	12,822	22,938	22,938
Groundwater Development Meets Intent of GBNP Visual Objectives	No	No	No	No	Yes	No	No
Groundwater Production Wells	Up to 174	Up to 117	Up to 136	Up to 117	Up to 83	Up to 83	Up to 117
Collector Pipelines and Electric Power Lines (miles)	Up to 434	Up to 246	Up to 236	Up to 246	Up to 206	Up to 210	Up to 332
Total Surface Disturbance from Permanent and Temporary ROW (acres)	Up to 8,410	Up to 4,814	Up to 4,664	Up to 4,814	Up to 4,005	Up to 4,079	Up to 6,620

3.15.3 Cumulative Impacts

3.15.3.1 Impacts Common to All Alternatives

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

3.15.3.2 Climate Change Effects to Visual Resources

Climate change effects were not evaluated for this resource because potential effects to visual as a result of climate change cannot be directly quantified.

Issues

Rights-of-way and Facility Maintenance

- Long-term, cumulative visual resource changes resulting from aboveground facilities, power lines, project surface disturbance, construction-generated dust, and potential light sources due to past, present, and RFFAs as seen from public viewpoints on roadways, residential areas, and public lands visited by tourists and recreational users (e.g., GBNP, Humboldt-Toiyabe National Forest, NWRs, scenic byways, and other formal and informal recreational areas).
- Compliance of cumulative effects from past, present, and RFFAs on public lands with visual resource objectives.

Groundwater Pumping Effects

- Changes in vegetation appearance of hydrologic basins as the result of groundwater drawdown from PPAs and RFFAs.

Assumptions

Rights-of-way and Facility Maintenance

- Study Area. The study area includes the affected valleys or hydrologic basin boundaries which naturally define viewshed boundaries from low elevations as shown on **Figure 3.3.1-1**. When viewed from higher elevations, the study area extends 15 miles from the proposed ROWs and groundwater development areas. This corresponds to the BLM background distance zone for visual resource analysis.
- The PPAs and RFFA footprints are based on utility ROWs and other surface disturbance activities identified in BLM and other databases (see Chapter 2, **Table 2.9-1** and Section 2.9, Description of the Proposed Action and Alternatives). No cumulative effects to visual resources related to surface development activities are anticipated outside the basins affected by ROW and groundwater development activities.
- Time frames. Surface disturbance effects range from full build out of the ROW facilities (approximately 2050) to full build out plus 75 years, which is the estimated time for some vegetation species to recover to their former density and size.

Groundwater Pumping Effects

- The groundwater pumping effects study area is the regional model boundary, as shown on **Figure 3.0-1**.
- Time frames. Time frames for groundwater pumping effects range from full build out of the entire project (approximately 2050) to full build out plus 75 years, which is the estimated time for some vegetation species to recover to their former density and size.

Methodology for Analysis

Rights-of-way and Facility Maintenance

- The cumulative effect of aboveground facilities to the scenic quality and landscape character of the study area were estimated by identifying aboveground facilities for PPAs and RFFAs, and the development areas for the project alternative within each basin viewshed. Because the Basin and Range physiographic pattern of broad, low desert plains bounded by high mountain ridges provides for wide and distant vistas (Section 3.15.1.2), it is reasonable that cumulative effects would occur within the same viewshed.
- Cumulative impacts to visual resources would occur where project facilities, PPAs, and RFFAs change high scenic quality areas (as represented by VRI Class I and II, and VRM Class I and II areas) or occupy the same field of view as PPAs and RFFAs, so that changes in the visible landscape character are perceived. For example, cumulative impacts would occur if a viewer perceives that the scenic quality or landscape character of a viewshed (i.e., Spring Valley) or multiple basins (study area as seen from highways) is diminished by the proliferation of aboveground structures or construction effects, even if the changes are not within the same field of view as existing or future structures. The result is a perceived "cultural modification" of the existing landscape character.

Groundwater Pumping Effects

- Cumulative visual effects were qualitatively estimated from Section 3.5, Vegetation Resources, cumulative based on the potential changes to Wetland/Meadow and Basin Shrubland, springs, and perennial stream reaches.

3.15.3.3 No Action

Under No Action, the proposed groundwater development facilities would not be constructed. However, the cumulative effects of PPAs, as well as the RFFAs may occur as discussed in the next Section, 3.15.3.4, Proposed Action.

3.15.3.4 Proposed Action

Rights-of-way and Facility Maintenance

Cumulative Visual Resource Changes from Aboveground Facilities and Surface Disturbance

Historically, PPAs, aboveground development, and surface disturbance have resulted in transportation and utility corridors, rural communities, mining districts, wildfires, ranching and agriculture facilities, and recreational use areas. Highways, local roads, and distribution-voltage power lines occur in nearly every basin. Industrial uses and high-voltage power lines occur in Apex, north of Las Vegas. Major urban developments occur throughout the Las Vegas Valley. North of Las Vegas, commercial and residential areas are concentrated around the rural communities of Ely, McGill, Baker, Garrison, Pioche, and Panaca. Few high-voltage power lines above 138 kV exist, although multiple linear utility ROWs for high-voltage power lines and pipelines have been authorized by BLM and are considered as PPAs and construction has not commenced. While there are no steel power lines in the study area from Apex to Ely, construction began in 2010 on the 236-mile 500 kV ON Line Transmission Project which will be comprised of 100 to 185 feet tall single-circuit steel H-frame and lattice towers (BLM 2010). However, between the developed areas of Apex to Ely the overall level of development is low; most of the study area is characterized as a primarily natural-appearing Great Basin ranch landscape with historical, cultural and recreational points of interest.

RFFA surface disturbance areas are shown by hydrologic basin in **Table 2.9-1** and **Figures 2.9-1** and **2.9-2** illustrate RFFA locations. RFFA aboveground facilities that fall within the same hydrologic basins as project alternatives have the most potential to create foreseeable future changes to the scenic quality and landscape character of the study area.

Cumulative Effects. Visual resource cumulative effects would result from the Proposed Action, the PPAs, and RFFAs including a new utility corridor and associated facility developments that would generally parallel the proposed project in the SWIP and LCCRDA corridors. Because the majority of the project is located in a designated utility corridor, it is

probable that additional development would occur in the corridor if the proposed project is not developed. The visual impact of each reasonably foreseeable type of activity (e.g., wind, high-voltage power lines, roads, water development) is dependent on its siting, facility design, lighting, compliance with VRM best practices, and relationship to sensitive viewing areas. Similar to the Proposed Action, all of the wind, high-voltage power lines, and water development project types require vegetation removal and site grading, access roads, staging areas, underground or overhead collection and communication lines, and operation and maintenance facilities, resulting in increased human presence, increased vehicle traffic, and construction-generated dust similar to but at varying scales and extents than the construction and facility maintenance impacts described for the Proposed Action. The potential construction schedules for one or more of these projects could overlap the construction period for the Proposed Action, resulting in the potential for multiple construction activities visible within the same viewshed.

Wind generation projects generally include 3 or more commercial wind turbine generators that are typically over 300 feet tall sited in dispersed array patterns across high and low elevation areas. Due to their color, height, placement on the landscape, night lighting, and motion, wind generation are generally a major focus of viewer attention up to 12 miles, and individual wind turbine generators can be seen by the unaided human eye at distances up to 36 miles (Argonne National Laboratory 2012). The Spring Valley Wind Energy Facility shown in **Figure 3.15-8** consists of 66 wind generation turbines with a total height of approximately 130 meters (426 feet) and has been approved by BLM on 8,500 acres of BLM land in Spring Valley. Construction began on the Spring Valley Wind project in the summer of 2011, and is anticipated to be completed by June 30, 2012 (Pattern Energy 2012).

Figure 3.15-8 Photographic simulation of the Spring Valley Wind Energy Facility as seen from Wheeler Peak (BLM 2010)

The present LCCRDA utility corridor that extends from southern Dry Lake Valley to the vicinity of Apex is currently occupied by one electrical high-voltage power line and will be occupied by the ON Line Transmission Project under construction. The ON Line Transmission Project shown in **Figure 3.15-9** consists of 100 to 185 feet tall single-circuit steel H-frame and lattice towers in an adjacent utility ROW. This project will increase the extent, scale, and magnitude of visual contrasts from new linear structures, access roads, and color and vegetation changes. Within the same viewshed as the Proposed Action, the TransWest Express, Zephyr, or other reasonably foreseeable high-voltage power line projects would result in additive visual contrasts comparable to the ON Line Transmission Project.

Roads and water development actions would result in visual impacts similar to the Proposed Action, with long-term impacts to visual resources consisting of moderate form, line, color, and texture contrasts of the revegetated pipeline ROW and aboveground power lines with the existing predominantly natural setting. New access roads, authorized and unauthorized OHV recreational trails, and highway improvements would create an extensive network of roads that when viewed together would result in a fragmented landscape appearance that would be highly visible from high elevations.

- Spring Valley – the Proposed Action when combined with existing and future wind, power, and linear ROWs crossing VRM Class II and III would dominate attention.
- Steptoe Valley – the Proposed Action when combined with existing and future linear ROWs crossing VRM Class II and III in the vicinity of Ely would attract attention.

Conclusion. The Proposed Action when considered with existing and RFFAs would meet USFS and GBNP visual quality objectives for land administered by USFS and NPS, but would not meet the intent of GBNP viewshed preservation objectives outside of NPS boundaries.

The majority of cumulative projects cross BLM lands managed for VRM Class IV. Individual PPAs and RFFP activities may be consistent with VRM II, III, and IV objectives, depending on the distance from which facilities would be viewed and the VRM Class in which they are located. However, the type, number, magnitude, and geographic extent of cumulative projects located in relatively close proximity to each other within the same basin could potentially attract or dominate attention, increasing the potential that Class II and III objectives would not be met in many of the affected valleys. Wind energy projects in particular have the potential to be highly visible from distances of more than 30 miles, depending on the size of the turbines and other factors such as atmospheric conditions and intervening terrain. The Proposed Action's contribution to the development of the desert landscape would potentially conflict with BLM VRM Classes II and III when considered with existing and RFFAs within the immediate viewsheds of Dry Lake, Lake, Spring, and Steptoe valleys. In addition, cumulative development in the designated utility corridor would also potentially conflict with established VRM classes. As a result, future VRIs and RMP VRM Class decisions may downgrade, or change VRM Class II and III lands to VRM Class IV.

Groundwater Pumping Effects

Gradual and subtle visual changes to ET areas and wetlands below springs may result from long term cumulative groundwater pumping. See the discussion of cumulative effects to vegetation, and the relative contribution of the GWD Project alternatives to the total cumulative effects in Section 3.5, Vegetation Resources.

Table 3.15-16 summarizes the impacts from groundwater development area construction, operations, and maintenance for Alternatives A through F as compared to the Proposed Action.

Table 3.15-16 Summary of Cumulative Visual Impacts for Alternatives A through F, Groundwater Development Areas

Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Development					
Effects would be similar to the Proposed Action, although reduced in extent as groundwater development areas are reduced in Alternative A.	Cumulative effects to visual resources would occur in all basins from Alternative B similar to Alternative A.	Cumulative effects to visual resources would occur in all basins from Alternative C similar to Alternative A.	Cumulative effects to visual resources would occur in all basins from Alternative D similar to Alternative A, except in Spring Valley north of the White Pine County line and Snake Valley where no impacts would occur.	Cumulative effects to visual resources would occur in all basins from Alternative E similar to Alternative A, except in Snake Valley where no impacts would occur.	Cumulative effects to visual resources would occur in all basins from Alternative E similar to Alternative A, except in Snake Valley where no impacts would occur.
Pumping					
Gradual and subtle changes in vegetation community composition and appearance may occur over long periods of time. The ability to recognize this change would vary by the relative experience of the viewer with the landscapes affected. See Section 3.5, Vegetation Resources, for the potential trends in vegetation composition and structure in response to groundwater pumping.					

BLM

Kim Munson 2011

3.16 Cultural Resources

3.16.1 Affected Environment

3.16.1.1 Overview

Cultural resources are definite locations of human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include sites or places of traditional, cultural, or religious importance to social and/or cultural groups, including Indian tribes. Cultural resources are concrete, material places and things that are located, classified, ranked, and managed through the system of identifying, protecting, and utilizing for public benefit.

Quick Reference

ACHP – Advisory Council on Historic Preservation
APE – Area of Potential Effect
ACM – Applicant-committed Protection Measure
ARPA – Archaeological Resource Protection Act
BP – Before Present
CFR – Code of Federal Regulations
CR – Cultural Resources
NAGPRA – Native American Graves Protection and Repatriation Act
NHPA – National Historic Preservation Act
NPS – National Park Service
NRHP – National Register of Historic Places
PA – Programmatic Agreement
RFFA – Reasonably Foreseeable Future Actions
SHPO – State Historic Preservation Office

The analysis area for cultural resources generally corresponds to the geographic area of the APE used in the NHPA process. Per the NHPA, an APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking" (36 CFR 800.16[d]). There are three types of APEs for the proposed GWD Project: direct effects APE, indirect and cumulative effects APE, and visual effects APE. The geographic areas defined by the APEs for direct and visual effects used in the NHPA process correspond to the size, scale, and physical characteristics of the proposed GWD Project and its future NEPA tiers, features of the land, and the types of cultural resources in the area.

For the proposed GWD Project, the APE for direct effects, including determination of the APE for direct effects as future NEPA tiers of the proposed GWD Project are defined, includes the areas within the temporary and permanent ROWs granted by the BLM over public lands, or any area of easement, lease, purchase or ROW granted to SNWA on state, private, or other federal lands, where any element of the proposed GWD Project is to be located or where ground-disturbing activities are planned for the proposed GWD Project. This may include, but is not limited to: 1) newly constructed or graded access roads; 2) areas identified for the staging of materials or storage of heavy equipment; and 3) areas identified for the excavation or deposition of borrow material.

The APE for visual effects, including determination of the APE for visual effects as future tiers are defined, includes above-ground historic properties in the area from which above-ground facilities less than 100 feet in height may be visible. This is measured as follows: 1) for linear facilities or roads, the visual APE extends outward 1 mile on either side of the ROW centerline, easement, or other right of possession granted for the facility or road; and 2) for non-linear facilities, the visual APE includes a circular area with a radius of 1 mile from the center point of the facility.

The APE for indirect and cumulative effects (e.g., areas of possible subsidence caused by groundwater pumping), including determination of the APE for indirect and cumulative effects as Future Tiers of the proposed GWD Project are defined, would be determined by the BLM, in consultation with the SHPO, taking into account the nature, scope, and intensity of the potential indirect or cumulative effects to historic properties. For purposes of the NEPA analysis, the indirect and cumulative effects APEs encompass the 35 hydrologic basins identified in the water resources study area (see Section 3.3, Water Resources).

Regulatory Framework

Federal historic preservation legislation provides a legal environment for documentation, evaluation, and protection of archaeological and historic sites that may be affected by federal undertakings, including private undertakings operating under federal license or on federally-managed lands. The NEPA states that federal undertakings shall take into consideration impacts to the natural environment with respect to an array of resources, and that alternatives must be considered. The courts have made it clear that cultural resources are regarded as part of the natural environment. The NHPA, as amended through 2006, it established the ACHP and expanded the NRHP. The NHPA mandates that federal agencies consider the effect of an undertaking on cultural resources that are listed on or eligible for the NRHP, and section 106 of the NHPA establishes a four-step review process by which such resources are considered. The four steps are as follows:

1. Initiate the section 106 process by establishing the undertaking, defining the APE, and consulting with the appropriate parties, including federal agencies, SHPO, ACHP, Indian tribes, local governments, and the public;
2. Identify historic properties through inventory and evaluation;
3. Assess adverse effects by applying the criteria of adverse effects; and
4. If adverse effects will occur, then take appropriate steps to resolve those effects.

Apart from the requirements of the NHPA relating to historic properties, cultural resources are governed by several statutes, regulations, executive orders, and other authorities. Cultural resource authorities include the AIRFA, Archaeological Resources Protection Act (ARPA) of 1979, NAGPRA, EO 13007 (Sacred Sites), and Secretarial Order No. 3215, regarding trust assets. The analysis of the proposed GWD Project includes identification of cultural resources subject to these authorities. While the NHPA is discussed in detail in this regulatory framework discussion, Section 3.17, Native American Traditional Values, summarizes other cultural resources authorities in further detail and they are incorporated here by reference.

Regulations in 36 CFR Part 800 outline the process through which historic preservation legislation under the NHPA is administered. Regulations in 36 CFR 800.14 allow federal agencies to adopt program alternatives to 36 CFR Part 800 and to tailor the section 106 process to better fit agency procedures or a specific project. One type of program alternative is a PA, which is negotiated between the agency, SHPO, and ACHP. A PA for a complex project lays out the steps that the agency and the consulting parties agree to take to consider and resolve any adverse effects that the project might have on historic properties. A PA among the BLM, Nevada SHPO, ACHP, and SNWA was developed for the GWD Project and can be found in **Appendix F3.16**. The PA outlines general and specific measures that the BLM will take to fulfill its objectives and responsibilities regarding the protection of historic properties under the NHPA. In a letter dated March 23, 2012, the USACE designated the BLM as the lead federal agency to act on their behalf for purposes of compliance with section 106 of the NHPA (Gipson 2012).

As part of the PA process, the BLM sent letters to local governments, organizations, and agencies inviting them to be consulting parties to the agreement. Many of the groups accepted the BLM's invitation to participate as a consulting party. These groups include the following:

- Archaeo-Nevada Society (Department of Human Behavior);
- Bureau of Indian Affairs;
- Great Basin National Heritage Area Partnership;
- National Park Service (GBNP);
- Nevada Rock Art Foundation;
- Preserve Nevada;
- USFWS; and
- White Pine County Board of County Commissioners.

Consulting parties are defined by the ACHP regulations as "Certain individuals and organizations with a demonstrated interest in the undertaking [who] may participate as consulting parties due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effect on historic properties" (36 CFR 800.2[c][5]). The regulations emphasize that the "views of the public are essential to informed federal decision-making in the section 106 process" (36 CFR 800.2[d][1]). Each of the consulting parties has been afforded a reasonable opportunity to participate in the development and finalization of the PA and has been invited to participate as a concurring party. A concurring party concurs in the terms of the PA, and may participate in and benefit from the PA. Parties with a right to consult independent of the PA, such as Indian tribes, will be consulted in the section 106 process regardless of their status as a concurring party.

In addition to the organizations, local governments, and agencies listed above, the BLM has made a reasonable and good faith effort to identify and seek government-to-government consultation (EO 13175) with every federally recognized Indian tribe with ancestral ties to the analysis area that "attaches religious and cultural significance to historic properties that may be affected by an undertaking" (Section 101[d][6][B] of the NHPA). "Such Indian tribes shall be a consulting party" (36 CFR 800.2[c][2][B][ii]). The BLM provided draft copies of the PA to the Indian tribes and held informational meetings with interested tribal representatives to explain the contents of the PA and to record any suggested changes to the PA. Each of the identified Indian tribes also has been invited to participate as a concurring party. Appendix F3.16 contains the full text of the PA, as well as a letter dated March 24, 2011, from the Paiute Indian Tribe of Utah and a letter dated May 7, 2012, from the Goshute, Ely Shoshone, and Duckwater tribes declining to sign the PA as concurring parties and stating their reasons. For a full discussion of the tribal consultation efforts for the proposed GWD Project, the reader is referred to Section 3.17, Native American Traditional Values.

Eligibility Criteria for Listing Cultural Resources on the NRHP

The NRHP, maintained by the NPS on behalf of the U.S. Secretary of the Interior, is the nation's inventory of historic properties. In general, the NPS has established three main standards that a property must meet to qualify for listing on the NRHP: age, integrity, and significance. To meet the age criteria, a property generally must be at least 50 years old. To meet the integrity criteria, a property must "possess integrity of location, design, setting, materials, workmanship, feeling, and association" (36 CFR 60.4). To meet the significance criteria, a property must meet one or more of the following criteria:

- **Criterion A:** Be associated with events that have made a significant contribution to the broad patterns of our history.
- **Criterion B:** Be associated with the lives of persons who are significant in our past.
- **Criterion C:** Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; possess high artistic values; or represent a significant and distinguishable entity whose components might lack individual distinction.
- **Criterion D:** Have yielded or may be likely to yield information that is important in prehistory or history (36 CFR 60.4).

To qualify for NRHP eligibility, a property must meet two separate types of requirements. It must exhibit integrity of location, design, setting, materials, workmanship, feeling, and association, and it must meet one or more of the four above-listed criteria. The NHPA makes clear that a site need not be of national historic significance to be considered eligible; sites of local or state significance also may be listed, and thus are significant in the legal sense. A site does not have to be included in the NRHP to receive special consideration under the law, but must only meet the requirements of eligibility.

Regional Overview

The following are brief summaries of the prehistoric and historic periods in the Great Basin. Information contained in the summaries was extrapolated from Baldrica (2003), d'Azevedo (1986), Lyneis (1982), and McBride (2002). For more detailed discussions of these periods, the reader is referred to the four listed sources.

Prehistory

Paleoindian (13,500–11,000 Before Present [B.P.])

This period marks the transition from Pleistocene (geological epoch from 2.6 million to 12,000 years B.P.) to Holocene (geological epoch which began approximately 12,000 B.P.) climatic conditions. Paleoindian sites usually are associated with pluvial lakes, shoreline features, riparian areas, marshes, or along river terraces. Diagnostic tools include a variety of stemmed projectile points (Great Basin Stemmed series) as well as fluted Clovis and unfluted lanceolate types (Beck and Jones 1988). Paleoindian cultures hunted big game (e.g., mammoth, bison) and smaller game animals (e.g., rabbit, fox) and gathered easily processed lacustrine and marsh-related resources such as cattail pollen, shoots, and green seeds. Other plant resources utilized by Paleoindian groups include grasses, bulbs, nuts, roots, and berries.

Clovis

Early Archaic (11,000–4,000 B.P.)

This period is characterized by a transition to a warmer, drier Holocene environment that resulted in the drying out of lakes, streams, and springs; this change caused subsequent changes in vegetation patterns (Aikens and Madsen 1986). Archaeological investigations conducted at Early Archaic sites indicate a greater exploitation of diverse habitats, with less reliance on hunting and more reliance on plant resources. Groundstone tools became more widespread, suggesting greater reliance on plant resources such as seeds. Diagnostic projectile points of this period include Humboldt and Pinto Series points and Northern Side-notched points. Because of the generally warmer and drier conditions during the Early Archaic period, populations in the Great Basin seem to have shifted from lakeshore environments to a wider variety of locales, including those near drainages and remnant pluvial lakes, caves, and rock shelters.

Middle Archaic (4,000–1,500 B.P)

This period is marked by a shift to cooler, moister conditions in which streams and springs began to flow again and in which marshes were re-established in some places. As a result of the increase in available surface water, there was a greater diversity of plant resources. Middle Archaic populations exploited a wide range of habitats and re-occupied residential sites and seasonal camps. Overall settlement patterns were relatively mobile, with movements timed to take advantage of resources maturing at different times in different elevation zones. Sites and camps contained features such as hearths, cache pits, food storage pits, and house depressions. Diagnostic tools of this period include Gatecliff Series projectile points, as well as the Humboldt, Pinto, and Elko Series projectile points. Milling equipment such as manos, metates, mortars, and pestles became a more prominent element of the Middle Archaic culture, suggesting an increased reliance on processing of plant foods.

Humboldt

Late Archaic (1,500–160 B.P.)

During the Late Archaic, the climate became warmer and drier, similar to the current climate. The period generally is characterized by a reduction in population and abandonment of pluvial lake-margin sites. Subsistence and settlement patterns varied and ranged from nomadic groups that used a variety of ecological zones to more sedentary groups that used primarily cultivated and locally-procured wild resources (Lyneis 1982). Groundstone artifacts such as manos and metates increased during this period, indicating an even greater reliance on plant resources than in previous times. Other artifacts associated with the Late Archaic period include drills, punches, manos, metates, basketry, slings, animal decoys, mats, and marine shell beads. The first half of the Late Archaic is marked by the appearance of the bow and arrow with accompanying smaller and lighter Rosegate Series points. Later, Rosegate Series points were replaced by Desert Side-notched and Cottonwood Series points. The introduction of brownware pottery at about 900 B.P. and better groundstone technologies led to the consumption of pine nuts and an increase in other plant foods (tubers, bunch grasses) throughout the Great Basin. Larger sites are located on the valley floors, with seasonal pine nut gathering and temporary hunting camps set up in higher altitudes where big game hunting and pine nut activities were a major part of daily activities.

Gatecliff

Rosegate

Fremont (1,600-700 B.P.)

During the Late Archaic, the eastern Great Basin saw the emergence of the Fremont Culture. The Fremont people manufactured well-made, thin-walled, black-on-grey carbon-painted pottery and frequently lived in sizable villages (Grayson 1993). Artifacts that have been found throughout the Fremont region include sandals that were made with deer-leg hides, using the dew claws as heels; basketry that was with a *one rod and bundle* weaving technique; and pottery that had unique patterns and tempers. Though a distinct culture, the Fremont Culture shared the development of corn agriculture and the expansion of organized sedentary villages with contemporary farming cultures, such as the Ancestral Puebloan (who lived throughout the southwest in the 11th and 14th centuries). For currently unknown reasons, the Fremont people abandoned the Great Basin after about 650 B.P., possibly because of environmental change and the migration of other groups into the area (Marwitt 1986).

Desert Side-Notched

Early and Late Ceramic Period (1,450-100 B.P.)

In the southern extension of the Great Basin, the Virgin Anasazi Culture emerged and concentrated around the Virgin and Muddy Rivers in the Moapa and Virgin valleys. Chronologically, the Virgin Anasazi Culture has been divided into four phases: Moapa Phase, Muddy River Phase, Lost City Phase, and Mesa House Phase. As with other Ancestral Puebloan cultures, the Virgin Anasazi is distinguished through ceramic technology. Graywares (Moapa and Logandale) are the initially identified ceramic types for the Virgin Anasazi Culture and are present throughout the cultural sequence. Tusayan Gray Ware, Virgin Series appears later in the ceramic period (Allison 2000). In lesser quantities across the region are San Juan Redware, Tsegi Orange Ware, and Tusayan White Ware, Kayenta Series. Shinarump wares are rare in the Moapa and Virgin valleys (Lyneis and Hays-Gilpin 2008). Architectural features that remain from phases of the Virgin Anasazi occupation consist of aboveground square and rectangle structures of adobe and masonry (called "pueblos") and circular, semi-subterranean pit-house structures; kivas or similar ceremonial structures are rare (Lyneis 1995).

Archaeological investigations at various sites within the Moapa Valley suggest that the inhabitants practiced irrigation farming in the river valleys and supplemented their diets by collecting wild foodstuffs; they cultivated pumpkins, corn, and tepary beans in fields along the riverbanks, and acquired natural foods such as agave, yucca, screwbeans, and pinyon seeds from the higher elevations (Lyneis 1996). The Virgin Anasazi culture declined and the appearance of Desert Side-notched projectile points and brownware ceramics indicates the possible movement of Numic-speaking peoples (Shoshone, Paiute, Ute) into the Great Basin around 1,000 B.P. Several rock shelters in the southern reaches of the Great Basin contain Southern Paiute brownware ceramics and Desert Side-notched projectile points.

Protohistoric Period

Protohistoric is defined as the period or stage of human development or of a particular culture immediately prior to the emergence of writing. The Protohistoric Period was a critical time in the evolution of indigenous populations. Encroachment by European explorers during the 16th Century and their imposition of cultural values compromised the lifeways and traditions of Native Americans. At the time of European contact, the Great Basin was inhabited by hunters and gatherers who were related culturally and linguistically. Early descriptions of Nevada Native Americans describe them as a poor, starving people living in a barren land. The indigenous populations exploited their environment through a series of patterned movements from season to season based on information derived from traditional knowledge, input from their neighbors, and observations from individuals within the group. An expanded discussion of Nevada's Native American groups can be found in Section 3.17, Native American Traditional Values.

History

Spanish Exploration (1776)

In 1776, Father Francisco Garces used Mojave Indian guides to travel from Sonora to Los Angeles, to initiate a route to Santa Fe. During the trip, he traced segments of an ancient trading route (the Old Mojave Trail), crossing what is believed to be the southern tip of Nevada. In the same year, Father Francisco Dominguez and Francisco Escalante set out to explore a route from Santa Fe to Monterey, but they never crossed the present-day border between Utah and Nevada.

Traders, Trappers, and Trails (1820s–1840s)

By the early 1800s, traders, fur trappers, and U.S. government-sponsored expeditions resulted in the exploration of the region. In 1826, Jedediah Strong Smith became the most prominent fur trader to cross into southeastern Nevada. On his second trip in 1827, Smith appears to have traveled across Nevada into White Pine County. In 1829, Antonio Armijo completed the first overland trade caravan between Santa Fe and Los Angeles, traveling by way of southern Las Vegas Valley. This trade route first came to be known as the Old Spanish Trail; however, the trading route that actually became the Old Spanish Trail was located farther north in northern Las Vegas Valley. By 1830, the Old Spanish Trail, which partially followed the Escalante and Dominguez route, became a major thoroughfare for organized caravans participating in extensive trade. In southern Nevada, physical evidence of the trail has been obscured by subsequent transportation development. The proposed GWD Project would not cross any known segments of the Old Spanish Trail.

U.S. Government-Sponsored Expeditions (1834–1871)

During the 1840s, John C. Fremont became a significant American explorer and traveled with Kit Carson and Joseph Walker through Las Vegas Valley and again just northwest of the analysis area. In 1859, the U.S. War Department sent Captain James H. Simpson (Corps of Topographic Engineers) and a group of mapmakers on a surveying expedition from Provo, Utah, through Nevada. Simpson's return route to Utah crossed the area southeast of Ely, in the middle of Spring Valley, approximately where present-day Highway 50 is located. The return route became known as the Central Route, which was used as the main transportation and settlement artery of central and eastern Nevada through the 1860s. In 1869, First Lieutenant George M. Wheeler undertook a major military reconnaissance and scientific expedition into eastern and southern Nevada. Wheeler's party might have crossed through the Steptoe Valley or Schell Creek Range.

Emigration and Settlement (1850s–1870s)

In 1848, a Mormon wagon train under the leadership of Lewis Manly set off in search of a shortcut from the Old Spanish Trail on its way to Los Angeles. The Manly party might have crossed the area west of Caliente in Dry Lake Valley. Emigrants began to settle in Nevada in the 1850s after the California Gold Rush. Panaca was eastern Nevada's first permanent settlement, founded as a Mormon colony in 1864. The town originally was part of Washington County, Utah, but the Congressional redrawing of boundaries in 1866 shifted Panaca into Nevada.

Development of Industry (1850–1950)

Mining

The mining boom hit eastern Nevada during the late 1860s. By 1869, earlier discoveries of silver (at the site of the Monte Cristo Mine in 1865 and Treasure Hill in 1867) generated a rush of prospectors and capital to the area. Toward the late 19th and early 20th centuries, numerous mines had been developed in the analysis area. The Nevada mining district was developed southeast of Ely in 1869 and produced manganese, silver, gold, lead, and copper. In that same year, the Cooper mining district, which is crossed by the northern extension of the analysis area, also was established. Other mining districts were soon established, including those in or near the Snake Range and southern Spring Valley.

A number of mining districts were established in or near the Snake Range. The Sacramento mining district was developed during the initial 1869 boom and yielded tungsten, gold, and silver. South of the Sacramento district, the Osceola district was established in the Snake Range after placer gold was discovered there in 1872; the mine closed in 1920. The analysis area crosses the Cooper Mining District, which is west of Osceola.

Located several miles east of the analysis area, at the southern rim of Dry Lake Valley in Lincoln County's Delamar Mountains, the mines of the Ferguson District were Nevada's most productive ore extraction sites during the 1890s. The mines were sold in 1902 to a mining operation headed by Simon Bamberger, and in 1906, the mines generated Nevada's third highest yield. Operation of the mines ceased in 1909 (Hulse 1971; Paher 1970). In Lincoln County, Pioche developed as one of Nevada's more famously lawless boomtowns after a silver strike there in the winter of 1863–1864. In 1874, prospectors established mining districts along the extreme southern rim of Cave Valley.

Mormons pioneered mining in Clark County, beginning with the Potosi mine in 1856. Around 1871, mining declined in Clark County as local Mormons left the area; mining resumed in the 1890s after the Mormons returned from Utah.

Mining activity in the county was boosted by the 1905 completion of the San Pedro, Los Angeles & Salt Lake Railroad.

Ranching, Agriculture, and Irrigation

In 1864, a small contingent of Mormon emigrants from Utah began settling cooperative farms and ranches in present-day Panaca, in eastern Nevada. Commercial agriculture and ranching in the central and southern portions of eastern Nevada initially developed in response to the mining boom that began in 1869. In irrigable locales of southeastern Nevada, agricultural production from the 1870s fluctuated in response to changing local markets and access to markets outside of the region. By the 1890s, livestock had become a mainstay of the region's economy.

From the turn of the century through World War I (WWI), many eastern Nevada agricultural producers and ranchers benefited from new state and federal legislation and land use initiatives, as well as from infrastructure development that improved productivity and market access. In 1906, completion of the Nevada Northern Railroad line to Ely gave local farmers access to distant markets. At the same time, development of the Ruth copper mines and the smelter operation of William McGill helped revitalize the local market for livestock and farming products in southern White Pine County.

The 1894 Carey Act and the 1902 Newlands Act made an increasing amount of public land available for irrigation development, which increased farming activity in White Pine County and in the Panaca area. As a result, the region experienced a boom in the first two decades of the 20th Century. After WWI, farmers and ranchers struggled as market prices began to decline. Regional drought in 1930 increased the economic problems. Raising livestock rebounded in the mid-1930s; however, by 1939, many small producers had become dependent on wage-paying jobs with the Work Projects Administration. The Taylor Grazing Act, which established federally regulated grazing districts, brought a new measure of land-use management to eastern Nevada ranching lands during the late 1930s and early 1940s. The region also saw gains from projects by the Civilian Conservation Corps.

Enacted by Congress in 1933, the Civilian Conservation Corps was one of the most popular New Deal programs to be implemented by the federal government during the Great Depression. Especially active in Nevada, the Civilian Conservation Corps provided the state with multiple forms of resource development and conservation work. Initially, the Civilian Conservation Corps employed men between the ages of 18 and 25 (the upper age limit was later extended to 28), as well as older out-of-work WWI veterans, who served as physical conditioning coaches and drivers. Civilian Conservation Corps workers planted trees, thinned forests for fire control, stocked fisheries, built wildlife shelters, dug ditches, constructed canals, controlled erosion, improved recreational facilities, and fought insect invasions. By 1942, the project was terminated due to WWII's demand for manpower.

Transportation and Communication (1850s–1950s)

Railroad Development

In 1880, the Wells depot on the transcontinental line of the Southern Pacific marked the closest railroad shipping point to the area around present-day Ely. A narrow-gauge line from the Southern Pacific to the mines in the Eureka area was completed by the Eureka & Palisades Railroad in 1875, only to be abandoned and then reactivated when mining activity in the area waned and then rebounded around the turn of the century. An Ely connection was not constructed until the early 20th Century, when railroad service became necessary for copper mining operations launched by Mark Requa, son of the owner of the Eureka & Palisades Railroad. Requa secured investments for the Nevada Northern Railroad, which extended northward approximately 140 miles, when completed, to a connection with the Southern Pacific Railroad at Cobre. In 1905, a line of the Salt Lake, Los Angeles & San Pedro Railroad was completed through southeastern Nevada. The Las Vegas and Tonopah Railroad extended northwest from Las Vegas through Goldfield to Tonopah but went out of business in 1918.

Highway Development: Lincoln Highway and Arrowhead Trail Highway

Modern highway development in Nevada was supported by the creation of the Lincoln Highway and by subsequent controversies surrounding its construction. For decades after its initial creation, the Lincoln Highway had extensive portions that remained dirt road. The original Nevada section of the route wound through Tippets Ranch, Shelburne Pass, Ely, Eureka, Austin, Fallon, Wadsworth, Carson City, and Reno. By 1917, frustrated county-based attempts to improve the highway led to the creation of the Nevada Department of Highways (now known as the Department of Transportation), which made the state eligible for federal highway funds under the Federal Aid Road Act of 1916.

During the early 1920s, Lincoln Highway construction was delayed by Utah's attempt to improve a southerly transatlantic route that would keep travelers in the state for longer periods and direct traffic to Los Angeles. In response, the town of Ely and the Nevada Consolidated Copper Company joined in a boycott of Salt Lake City businesses.

The conflict was further complicated when San Francisco interests promoted development of a northern route through Nevada. Known as the "Victory Highway," this route, which follows present-day U.S. 40 and I-80, was designated SR 1, while the Lincoln Highway was designated SR 2. Construction on the Lincoln Highway continued into the 1930s. By 1936, the Lincoln Highway route from Robinson Summit through Ely to McGill was fully paved with asphalt and/or asphaltic gravel. In White Pine County, the original Lincoln Highway route and subsequent early 20th Century realignments generally follow present-day U.S. 93 between McGill and Ely. From Ely, they turn to the northwest, intermittently paralleling and intersecting present-day U.S. 50 (Franzwa and Petersen 2004). These eastern Nevada portions of the Lincoln Highway lie northwest of the analysis area and would not be intersected by the proposed GWD Project.

The Arrowhead Trail or Arrowhead Highway was the first all-weather road connecting Los Angeles to Salt Lake City by way of Las Vegas. Built primarily in the late 1910s and viable roughly contemporaneously with Route 66, the road has since been supplanted by U.S. Route 91 and subsequently, by Interstate 15. Small portions of the route in California and Las Vegas (Las Vegas Boulevard) are sometimes still referred to as Arrow Highway.

3.16.1.2 Right-of-way Areas and Groundwater Development Areas

Cultural Resources Investigations

Files Search

In the summer of 2008, a files search was completed to identify all previously conducted cultural resources investigations and known cultural resources within 1 mile of the proposed pipeline and power line ROWs, which includes proposed pumping stations, electrical substations, the buried storage reservoir, and water treatment facility (Jones & Stokes 2008). At this time, no files search has been conducted for the locations of future facilities. An additional files search would be conducted for Future Tiers of the proposed GWD Project. The current files search was conducted through numerous sources, including the Harry Reid Center for Environmental Studies at the University of Nevada, University of Las Vegas Library, BLM Ely and Southern Nevada District Offices, and Nevada Cultural Resources Information System. Additional information was collected from General Land Office survey plats and historic maps; county assessor offices in Clark, Lincoln, and White Pine counties; and Nevada historical societies and museums. A total of 327 cultural resources investigations previously were conducted in the files search study area. Of these, 207 investigations fall completely or partially within 300 feet of the proposed ROWs or facilities listed above. Based on the files search, approximately 11 percent of the files search study area has been previously surveyed for cultural resources.

The files search resulted in the preliminary identification of 657 cultural resources that had been previously recorded within the files search study area. Of these 657 previously recorded sites and isolates, 488 resources are prehistoric, comprising 310 sites and 178 isolated finds; 117 resources are historic, comprising 82 sites and 35 isolated finds; and 22 resources are multi-component sites that contain both prehistoric and historic components. No information is available for 30 sites and isolates that have been assigned site numbers.

Of the 657 previously recorded cultural resources identified in the files search study area, 184 are within 300 feet of the proposed ROWs or facilities listed above. Twenty-two of the sites are eligible for listing on the NRHP. These 22 sites include 9 lithic scatters, 4 artifact scatters, 3 rock shelters, 2 habitation sites, a military installation, mining camp, quarry/camp, and lithic scatter/road. Due to the sensitive and confidential nature of these resources, no site-specific locational information is provided in this EIS.

Class III (Pedestrian) Inventory

Per the terms of the PA, a combination of inventory and consultation would be used to determine the presence of historic properties and other cultural resources in the APE. Archaeological resources would be identified by means of intensive pedestrian Class III inventory; identification and evaluation of archaeological resources would be accomplished by persons meeting the Secretary of the Interior's qualifications. Architectural resources (e.g., buildings,

structures) also may be identified initially during this Class III archaeological inventory, or as a result of archival research; evaluation of architectural resources would be accomplished by persons meeting the Secretary of the Interior's qualifications. In recognition of their particular expertise, Indian tribes and their designated knowledgeable representatives would be consulted to establish the locations and importance of properties of cultural and religious importance.

The results of the Class III inventory would be documented in a technical report, which would be submitted to the BLM and Nevada SHPO for review. Site numbers, types, locations, and distribution, as well as the condition of cultural resources identified during the inventory would be included in the report. Additionally, the report would provide sufficient information on the appearance, significance, and integrity of each resource to evaluate eligibility to the NRHP. The BLM would be responsible to review the results of inventory, determine NRHP eligibility, assess effects, and seek resolution of adverse effects in consultation with the SHPO and consulting parties, including Indian tribes, per terms of the PA.

3.16.2 Environmental Consequences

The following sections provide a site-specific environmental impact analysis for construction and operation of the proposed ROWs and facilities requested in the Tier I ROW request.

3.16.2.1 Rights-of-way

Issues

The following issues for cultural resources are discussed as part of the impact analysis of construction and facility maintenance.

- Construction of the GWD Project and its associated facilities could affect historic properties and other cultural resources if they cannot be avoided.
- Previously undiscovered cultural resources, including burials, and associated funerary objects, could be discovered and directly affected during ground-disturbing activities that are associated with project construction.
- Potential indirect effects, such as unauthorized artifact collection and vandalism, could potentially increase in frequency.
- Introduction of visual or auditory elements could diminish the integrity of a historic property's significant historic features, including setting.

Assumptions

The impact analysis of cultural resources is based on the following assumptions:

- A Class III inventory would be conducted within the APE for direct effects and all sites located during the inventory will be evaluated for eligibility to the NRHP.
- If possible, all historic properties would be avoided by project construction. For those historic properties that cannot be avoided by project construction, a Historic Properties Treatment Plan would be prepared by SNWA's archaeological subcontractor and reviewed and approved by the BLM and SHPO, in accordance with the terms of the PA. Historic properties that cannot be avoided by project construction would be mitigated in accordance with the Historic Properties Treatment Plan.
- For those cultural resources that do not meet the criteria of NRHP eligibility, the BLM, in consultation with interested tribes, would determine the appropriate means to avoid, minimize, or mitigate impacts on a case-by-case basis. Consultation also would occur regarding access to these sites.
- Mitigation measures requiring data recovery (archaeological excavation) would be subject to the provisions of ARPA, as applicable. The BLM would ensure that all records and materials resulting from identification and treatment efforts are curated in BLM-approved facilities or, if applicable, in accordance with NAGPRA regulations, or any Plan of Action in accordance with those regulations, as outlined in the PA.
- A Notice to Proceed would be issued after the BLM, in consultation with the SHPO, identified Indian tribes, and other consulting parties, determines that an appropriate treatment plan has been implemented; the fieldwork phase of the treatment plan has been completed; and the BLM has accepted a summary description of the fieldwork performed and a reporting schedule for that work, in accordance with the terms of the PA.

Methodology for Analysis

Surface disturbance impacts were evaluated for each alternative using the following method:

- The analysis of potential impacts to cultural resources is based on review of the existing literature and site information that were collected during the files and records search.
- Potential effects are quantified where possible. Where quantitative data (i.e., site totals) are unavailable, best professional judgment or qualitative assessments are used to describe impacts.

- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, PA, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect cultural resources from ROW construction and operation activities.
- Historic property, as defined by the regulations that implement section 106, means "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP" maintained by the NPS. The term includes properties of traditional religious and cultural importance to any Native American tribe that meet the National Register criteria (36 CFR 800.16[1][1]).
- Section 106 requires that potential impacts to historic properties are assessed by using the "criteria of adverse effect" (36 CFR 800.5[a][1]): "An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association." Adverse effects to historic properties include, but are not limited to:

    1. Physical destruction or alteration of a property or relocation from its historic location;
    2. Isolation or restriction of access;
    3. Change in the character of the property's use or of physical features within the property's setting that contribute to its historic significance, or the introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;
    4. Neglect of a property which leads to deterioration or vandalism; and
    5. Transfer, sale, or lease from federal to non-federal control, without adequate and legally enforceable restrictions or conditions to ensure the preservation of the historic significance of the property.

- In addition to historic properties that are subject to section 106 of the NHPA, other types of cultural resources may be subject to special consideration under ARPA, NAGPRA, EO 13007, and Secretarial Order 3215. Surface and subsurface disturbance that may affect cultural resources subject to special consideration under these additional regulations would be subject to tribal consultation, detailed analysis, and mitigation in accordance with the applicable regulation.

3.16.2.2 Proposed Action, Alternatives A through C

Construction and Facility Maintenance

All Construction and Facility Maintenance Impact Issues

Of the 184 sites previously recorded within 300 feet of the proposed ROWs and facilities associated with the Proposed Action and Alternatives A through C, 22 are eligible for listing on the NRHP. These 22 sites include 9 lithic scatters, 4 artifact scatters, 3 rock shelters, 2 habitation sites, a military installation, mining camp, quarry/camp, and lithic scatter/road. Due to the sensitive and confidential nature of these resources, no site-specific locational information (i.e., where these sites are located relative to proposed facilities or sections of the proposed ROWs) is included in the analysis of impacts for the Proposed Action and Alternatives A through C.

Ground-disturbing activities, such as excavation, construction of access roads, improvement of existing access roads, grading, and the use of staging areas for storage equipment and supplies, have the highest potential to directly affect historic properties and other cultural resources. Of particular concern are direct impacts associated with pipeline trenching, which would constitute the greatest amount of ground disturbance. These physical impacts could occur to both known sites and subsurface sites that could be discovered during ground-disturbing activities.

Vehicular traffic and crushing of vegetation in areas that would not be graded or excavated also could directly affect historic properties and other cultural resources by compacting soils, crushing artifacts, disturbing historic features (e.g., historic roads), or displacing cultural material from its original context. These types of activities also could affect properties of traditional religious and cultural importance to Native Americans.

Indirect effects to historic properties and other cultural resources often are not quantifiable and can occur both within and outside of the APE. Potential indirect effects could include changes in erosion patterns caused by construction, soil compaction, or vegetation removal; fugitive dust; off-road vehicle traffic associated with construction or facility maintenance activities; and vandalism, inadvertent damage, and illegal artifact collection due to increased access. Other potential indirect effects could include the introduction of visual or auditory elements that diminish the integrity of the historic property's significant historic features, including setting. These effects could result from introducing modern structures and associated auditory emissions into an otherwise rural or natural setting.

Historic properties located outside the APE, but within close proximity to the pipeline ROW would not be mitigated under the PA. These sites could be adversely affected if a rupture in the pipe were to occur near the sites. Subsequent effects of a rupture, such as flooding and erosion, could damage or destroy archaeological sites/historic structures and/or displace surface artifacts.

The potential for the discovery of unanticipated cultural resources during construction activities exists within proposed disturbance areas and could result in direct effects. Unanticipated discoveries could result in displacement or loss (either complete or partial) of the discovered material. Displacement of cultural material affects the potential to understand the context of the site and limits the ability to extrapolate data regarding prehistoric settlement and subsistence patterns.

Resolution of Construction and Facility Maintenance Impacts

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on cultural resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, PA, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

The PA developed for the proposed GWD Project outlines the steps to be taken to: 1) identify cultural resources; 2) evaluate them for eligibility for listing on the NRHP; 3) identify potential adverse effects; 4) develop measures to avoid, reduce, or mitigate adverse effects to historic properties; and 5) address unanticipated discoveries. Additionally, the PA assigns roles and responsibilities for its implementation, which ensures that all interested parties are given an opportunity to comment on the effects of an undertaking on historic properties and any mitigation for such effects. Finalization of the PA is pending additional input from interested federally recognized Tribes, consulting parties, and the public. A copy of the executed PA can be found in **Appendix F3-16**.

In consultation with the Nevada SHPO, interested Tribes, and other consulting parties to the PA, the BLM would determine whether construction and facility maintenance of the proposed GWD Project would have an adverse effect on any historic properties listed or eligible for listing on the NRHP. If the BLM determines that a historic property would be adversely affected, measures to avoid, minimize, or mitigate such effects would be proposed in accordance with the PA. Measures to avoid, minimize, or mitigate effects may include, but would not be limited to, one or more of the following:

- Avoidance through changes in the construction or operational design;
- Data recovery, which might include the systematic professional excavation and removal of archaeological resources;
- The use of landscaping or other techniques that would minimize or eliminate visual effects on a historic property's setting;
- Development of site-specific interpretive materials (e.g., leaflets, brochures);
- Historic American Buildings Survey/Historic American Engineering Record/Historic American Landscapes Survey or other agreed upon historic recordation process; or
- Other mitigation determined by the BLM through consultation with the SHPO, identified Indian Tribes, and other consulting parties.
- For those cultural resources that do not meet the criteria of NRHP eligibility but are significant to Native American tribes (e.g., sacred sites), the BLM, in consultation with interested tribes would determine the appropriate means to

avoid, minimize, or mitigate impacts on a case-by-case basis. Consultation also would occur regarding access to these sites.

Mitigation measures would be based on the types of impacts relevant to the site type. Unavoidable adverse effects to historic properties would be mitigated through implementation of a Historic Properties Treatment Plan. For sites that are eligible under National Register Criteria A, B, or C, other forms of mitigation (e.g., oral history, historic markers, exhibits, interpretive brochures, or publications) may be considered in the Historic Properties Treatment Plan in lieu of, or in addition to, data recovery. If data recovery is the preferred treatment option for a site, then the BLM would ensure that the developed treatment is based on an appropriate research design and is reviewed and approved by the BLM, SHPO, interested Tribes, and other consulting parties. Following approval by the BLM, SHPO, interested Tribes, and other consulting parties, the BLM would ensure that the Historic Properties Treatment Plan is implemented within the timelines set forth in the plan. If data recovery is proposed for a site of tribal importance, notification, and, as appropriate, consultation with interested Tribes would be conducted prior to issuance of the ARPA permit for removal/excavation of archaeological resources.

All ranch complexes located in the direct effects and visual APEs, and more than 40 years old, would be inventoried and recorded to the BLM standards. SNWA would develop a Historic Properties Treatment Plan for any of the ranch complexes adversely affected by the proposed GWD Project and that meet the criteria for NRHP eligibility for state or local importance. For those historic properties that the BLM determines are potentially eligible under one or more of the NRHP criteria, SNWA would record the properties with full descriptions and photo-documentation to current SHPO standards as outlined in the PA.

If a rupture and subsequent flooding were to occur, direct impacts to a historic property located outside of the pipeline ROW most likely would be immediate. In most instances, emergency response measures would be implemented after the site has been damaged or destroyed, thereby reducing the possibility of salvaging the site and its context. Mitigation of effects caused by a rupture and subsequent flooding and erosion would be determined on a site-specific basis by the BLM in consultation with the SHPO, interested Tribes, and other consulting parties.

To minimize potential effects such as illegal collection of artifacts and vandalism due to increased access, SNWA, in cooperation with the BLM and SHPO, would ensure that all its personnel, and all personnel of its contractors and their subcontractors are directed not to engage in the illegal collection, damage, or vandalism of historic and prehistoric resources as outlined in the PA. SNWA would cooperate with the BLM to ensure compliance with the ARPA for facilities and segments of the proposed GWD Project located on public lands, and with the provisions of NRS 383.

As provided in the PA, if any previously unknown cultural resources (other than isolates) are discovered during construction on BLM administered lands, all construction activities would cease within 325 feet of the discovery and the BLM would be notified of the find. Steps would be taken to protect the site from vandalism or further damage until the BLM could evaluate the nature of the discovery, as outlined in the PA. Construction would not resume in the area of the discovery until the BLM has issued a notice to proceed.

If construction or other project personnel discover what might be human remains, funerary objects, or items of cultural patrimony on federal land, then construction would cease within 325 feet of the discovery and the BLM would be notified of the find. Any discovered Native American human remains, funerary objects, or items of cultural patrimony found on federal land would be handled in accordance with NAGPRA and the procedures detailed in the PA, or in accordance with any Plan of Action executed for the proposed GWD Project. Non-Native American human remains on federal land would be handled in accordance with Nevada law. Construction would not resume in the area of the discovery until the BLM has issued a notice to proceed.

If human remains and associated funerary objects are discovered on private land during construction activities, construction would cease within 325 feet of the discovery and the county coroner or sheriff would be notified of the find. Treatment of any discovered Native American human remains and associated funerary objects found on private land would be handled in accordance with the provisions of NRS 383; non-Native American human remains would be handled in accordance with Nevada state law.

Conclusion. Approximately 12,300 acres would be disturbed as a result of construction activities. Direct impacts to historic properties and other cultural resources could increase in relation to the amount of ground disturbance associated with project construction. At this time, the number of historic properties and other cultural resources that could be affected by the proposed GWD Project is unknown. Intensive Class III inventories of all proposed disturbance areas would be conducted prior to project construction and with enough lead time to allow for evaluation of sites located during the inventories, assessment of impacts, and mitigation, if necessary. Unavoidable adverse effects to historic properties located within proposed disturbance areas or within the viewshed of proposed aboveground facilities would be mitigated in compliance with the PA. Any previously unknown cultural resources (other than isolates) discovered during construction activities would be handled as detailed in the PA.

Residual impacts include:

- GWD Project construction would result in the loss of cultural resources that are ineligible for the NRHP and located in proposed disturbance areas. Although these sites would be recorded and evaluated to BLM standards and the information integrated into local and statewide archaeological databases, the sites ultimately would be destroyed by project construction.
- If historic properties are identified within proposed disturbance areas, impacts would be avoided where possible by means such as project redesign or rerouting; if avoidance is not feasible, the impacts would be mitigated in compliance with the PA. Because some of the cultural value that is associated with these sites cannot be fully mitigated, residual impacts to these resources most likely would occur.
- Accidental disturbance, vandalism, and illegal collecting most likely would occur where the proposed GWD Project may result in increased public access.
- Impacts to historic standing structures or other cultural resources as a result of a rupture and subsequent flooding would be immediate. Reactive mitigation may not be sufficient to restore the damage. Damage to or loss of these resources would occur prior to their recordation and evaluation, thereby complicating mitigation procedures.

3.16.2.3 Alternative D

As a result of the files search, a total of 158 previously recorded sites were located within 300 feet of the proposed ROWs and facilities associated with Alternative D. Of these 158 sites, 19 are eligible for the NRHP. Due to the sensitive and confidential nature of these resources, no site-specific locational information (i.e., where these sites are located relative to proposed facilities or sections of the proposed ROWs) is included in the analysis of impacts for Alternative D.

The same ROW construction and operation issues discussed for the Proposed Action and Alternatives A through C would apply to Alternative D, which would involve 225 miles of pipeline and 208 miles of power lines in Clark and Lincoln counties only.

Conclusion. Approximately 8,800 acres would be disturbed as a result of construction activities. Direct impacts to historic properties and other cultural resources could increase in relation to the amount of ground disturbance associated with project construction. At this time, the number of historic properties and other cultural resources that could be affected by the proposed GWD Project is unknown. Intensive Class III inventories of all proposed disturbance areas would be conducted prior to project construction and with enough lead time to allow for evaluation of sites located during the inventories, assessment of impacts, and mitigation, if necessary. Unavoidable adverse effects to historic properties located within proposed disturbance areas or within the viewshed of proposed aboveground facilities would be mitigated in compliance with the PA. Any previously unknown cultural resources (other than isolates) discovered during construction activities would be handled as detailed in the PA. Residual impacts would be the same as identified for the Proposed Action and Alternatives A through C.

3.16.2.4 Alternatives E and F

As a result of the files search, a total of 177 previously recorded sites were located within 300 feet of the proposed ROWs and facilities associated with Alternative E. Of these 177 sites, 20 are eligible for the NRHP. Due to the sensitive and confidential nature of these resources, no site-specific locational information (i.e., where these sites are

located relative to proposed facilities or sections of the proposed ROWs) is included in the analysis of impacts for Alternatives E and F.

The same ROW construction and operation issues for the Proposed Action and Alternatives A through C would apply to Alternatives E and F, which would involve 263 miles of pipeline and 280 miles of power lines within Spring, Delamar, Dry Lake, and Cave valleys.

Conclusion. Approximately 10,700 acres would be disturbed as a result of construction activities. Direct impacts to historic properties and other cultural resources could increase in relation to the amount of ground disturbance associated with project construction. At this time, the number of historic properties and other cultural resources that could be affected by the proposed GWD Project is unknown. Intensive Class III inventories of all proposed disturbance areas would be conducted prior to project construction and with enough lead time to allow for evaluation of sites located during the inventories, assessment of impacts, and mitigation, if necessary. Unavoidable adverse effects to historic properties located within proposed disturbance areas or within the viewshed of proposed aboveground facilities would be mitigated in accordance with the PA. Any previously unknown cultural resources (other than isolates) discovered during construction activities would be handled as detailed in the PA. Residual impacts would be the same as identified for the Proposed Action and Alternatives A through C.

3.16.2.5 Alignment Options 1 through 4

Impacts for the Alignment Options 1 through 4 are identified in relation to the relevant segment of the Proposed Action (**Table 3.16-1**).

Table 3.16-1 Cultural Resources Impact Summary for Alignment Options 1 through 4

Alignment Option	Analysis
Alignment Option 1: (Humboldt-Toiyabe Power Line Alignment) **Option Description**: Change the location of a portion of the 230-kV power line from Gonder Substation near Ely to Spring Valley (see Section 2.6.7 for a full description). **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	Impacts (direct and visual) associated with Alignment Option 1 could be less than the comparable Proposed Action segment because there would be fewer acres of disturbance and Alignment Option 1 would be shorter in length.
Alignment Option 2 (North Lake Valley Pipeline Alignment) **Option Description**: Change the locations of portions of the mainline pipeline and electrical transmission line in North Lake Valley (see Section 2.6.7 for a full description). **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	Direct impacts associated with Alignment Option 2 could be greater than the comparable Proposed Action segment because there would be more acres of disturbance; visual impacts would be less than the comparable Proposed Action segment because portions of Alignment Option 2 would parallel an existing visual intrusion (Highway 93).
Alignment Option 3 (Muleshoe Substation and Power Line Alignment) **Option Description**: Eliminate the Gonder to Spring Valley transmission line, and construct a substation with an interconnection with an interstate, high voltage power line in Muleshole Valley (see Section 2.6.7 for a full description). **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	Direct impacts associated with Alignment Option 3 could be less than the comparable Proposed Action segment because there would be fewer acres of disturbance; visual impacts would be less than the comparable Proposed Action segment because the 230kV transmission line from Gonder to Spring Valley would be eliminated.
Alignment Option 4 (North Delamar Valley Pipeline and Power Line Alignment) **Option Description**: Change the location of a short section of mainline pipeline in Delamar Valley to follow an existing transmission line (see Section 2.6.7 for a full description). **Applicable To**: All alternatives.	Impacts (direct and visual) associated with Alignment Option 4 could be less than the comparable Proposed Action segment because there would be fewer acres of disturbance and Alignment Option 4 would parallel an existing transmission line.

3.16.2.6 No Action

Under the No Action Alternative, the proposed GWD Project would not be constructed or operated. No project-related surface disturbance would occur. As a result, none of the potential impacts to historic properties and other cultural resources as identified for the Proposed Action or Alternatives A through F would occur. Impacts to historic properties and other cultural resources would continue to occur at the current rate.

3.16.2.7 Comparison of Alternatives

The number of previously recorded historic properties and other cultural resources located within 300 feet of proposed ROWs and facilities associated with each alternative is shown in **Table 3.16-2.** As indicated in **Table 3.16-2**, there are more historic properties and other cultural resources previously recorded within 300 feet of proposed ROWs and facilities associated with the Proposed Action and Alternatives A through C compared to the other alternatives, with the lowest number of sites associated with Alternative D. The types of impacts (i.e., direct, indirect, visual) that could occur to historic properties and other cultural resources would be the same for each alternative, and as described for the Proposed Action, Alternatives A through C. Mitigation of impacts would be in accordance with the PA.

Table 3.16-2 Previously Recorded Historic Properties and Other Cultural Resources Located Within 300 Feet of Proposed ROWs and Facilities Associated with the Proposed Action and Alternatives A through F

Parameter	Proposed Action, Alternatives A through C	Alternative D	Alternative E	Alternative F
Previously Recorded Cultural Resources (number includes historic properties)	184	158	177	177
Previously Recorded Historic Properties	22	19	20	20

3.16.2.8 Groundwater Development and Groundwater Pumping

The following section provides a programmatic analysis of impacts associated with construction and operation of future groundwater well fields, collector pipelines, and associated facilities.

Issues

Groundwater Development Construction and Facility Maintenance

The same cultural resources issues discussed for ROW construction and facility maintenance would apply to groundwater development areas.

Groundwater Pumping

Subsidence associated with groundwater pumping could adversely affect above-ground historic properties and other cultural resources, such as historic standing structures, as well as subsurface archaeological sites.

Assumptions

Groundwater Development Construction and Facility Maintenance

The same cultural resources assumptions discussed for ROW construction and facility maintenance would apply to areas identified for future facilities.

Groundwater Pumping

Subsidence impacts caused by groundwater pumping could occur, which would affect above-ground historic properties and other cultural resources, as well as subsurface cultural resources.

Methodology for Analysis

Groundwater Development Construction and Facility Maintenance

- Site-specific data on the number and type of historic properties and other cultural resources that could be affected by groundwater development construction and facility maintenance is unavailable. Best professional judgment or qualitative assessments are used to describe impacts. For groundwater development, this is a programmatic EIS. A more detailed quantitative analysis of potential impacts to historic properties and other cultural resources from groundwater development would be considered in future site-specific tiered NEPA documents prior to any surface disturbance.
- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, PA, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect cultural resources from ROW construction and operation activities.
- Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

Groundwater Pumping

- Site-specific data on the number and type of historic properties that could be affected by groundwater pumping is unavailable. Best professional judgment or qualitative assessments are used to describe impacts.
- Subsidence impacts to historic properties would be assessed by using the "criteria of adverse effect."
- For historic properties and other cultural resources that could be impacted by subsidence attributable to groundwater pumping, appropriate subsidence monitoring and mitigation measures would be included in future project-specific approvals prior to groundwater pumping.
- The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on cultural resources. The COM Plan would integrate protective measures from the following: BLM

RMP Management Actions and BMPs, PA, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

- The GWD Project EIS includes a programmatic evaluation for future analysis and approvals for groundwater development. The necessary cultural resources data would be collected and analyzed in conjunction with future NEPA analysis for future tiers of the proposed GWD Project.

3.16.2.9 Proposed Action

Groundwater Development Area

Full development of the GWD Project would require groundwater production wells, collector pipelines, and associated facilities. Ground disturbance associated with construction of the wells, pipelines, and ancillary facilities could directly affect historic properties and other cultural resources. Also of concern are direct effects associated with construction traffic and crushing of vegetation in areas that would not be graded or excavated. Indirect effects, such as illegal collecting of artifacts, vandalism, and inadvertent damage could occur where the proposed GWD Project may result in increased public access. Proposed aboveground facilities located within the viewshed of a historic property could affect the integrity of the site's setting. Subsurface archaeological sites may be unearthed during project construction activities and result in displacement or loss of associated artifacts or the site itself.

Conclusion. Under the Proposed Action, as much as 5,536 acres of permanent ROW and as much as 2,874 acres of temporary ROW would be required within groundwater development areas. Direct impacts to historic properties and other cultural resources could increase in relation to the amount of ground disturbance associated with permanent and temporary ROWs (i.e., wells, pipelines, ancillary facilities). At this time, the number of historic properties and other cultural resources that could be affected by groundwater development is unknown. As stipulated in the PA, intensive Class III inventories of all future facility locations would be required prior to construction and with enough lead time to allow for NRHP evaluation of identified sites, impact assessments, and mitigation, if necessary. Unavoidable adverse effects to historic properties located within proposed disturbance areas or within the viewshed of proposed aboveground facilities would be mitigated in compliance with the PA. Unanticipated subsurface cultural material discovered during ground-disturbing activities would be handled as outlined in the PA.

Potential residual impacts include:

- GWD Project construction would result in the loss of cultural resources that are ineligible for the NRHP and located in proposed disturbance areas. Although these sites would be recorded to BLM standards and the information would be integrated into local and statewide archaeological databases, the sites ultimately would be destroyed by project construction.
- How many historic properties and other cultural resources would be adversely affected by the proposed GWD Project is currently unknown. If historic properties are identified within proposed disturbance areas, impacts would be avoided; if avoidance is not feasible, impacts would be mitigated as appropriate. Because some of the cultural value that is associated with these historic properties cannot be fully mitigated, residual impacts to these properties most likely would occur.
- Accidental disturbance, vandalism, and illegal collecting most likely would increase in the analysis area as a result of increased public access.
- Impacts to historic properties and other cultural resources as a result of a rupture and subsequent flooding would be immediate. Reactive mitigation may not be sufficient to restore the damage. Damage to or loss of these resources would occur prior to their recordation and evaluation, thereby complicating mitigation procedures.

Groundwater Pumping

The groundwater pumping scenario for the Proposed Action assumes pumping at the full quantities (176,655 afy) listed on the pending water rights application for the five proposed project pumping basins (Spring, Snake, Delamar, Dry Lake, and Cave valleys). Potential effects to historic properties and other cultural resources as a result of groundwater pumping could include subsidence. Subsidence could damage historic properties and other cultural resources, including historic standing structures; adversely affect the integrity of a site's setting; and, affect the stratigraphic integrity of buried archaeological deposits. In addition, subsidence could affect surface drainage flow resulting in undesirable

diversion and impoundment of water which could additionally impact surface archaeological sites by relocating artifacts resulting in a secondary deposit of archaeological material that contains no contextual integrity. The reader is referred to Section 3.2, Geologic Resources, for an expanded discussion of subsidence, and for a list of those areas considered at most risk for subsidence.

Conclusion. Impacts to subsurface archaeological sites could occur as a result of groundwater pumping; however, the extent and significance of those impacts are difficult to ascertain and quantify given the unpredictable nature of buried sites. Surface sites, including standing structures, currently are exposed to natural elements, which would continue to affect the structural integrity of these sites regardless of human interference.

If unanticipated indirect effects to cultural resources known or determined to be historic properties are indicated due to subsidence as a result of groundwater development, the BLM would determine whether the effects are reasonably attributable to the proposed GWD Project. If adverse effects to cultural resources known or determined to be historic properties are determined by the BLM to be attributable to the proposed GWD Project, the BLM would conduct consultation seeking to minimize, mitigate, or resolve the adverse effects per the terms of the PA.

3.16.2.10 Alternative A

Groundwater Development Area

Full development of the GWD Project would require groundwater production wells, collector pipelines, and ancillary facilities. Direct, indirect, and visual impacts to historic properties and other cultural resources could occur as a result of constructing these future facilities. Subsurface archaeological sites may be unearthed during project construction activities and result in displacement or loss of associated artifacts or the site itself. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities on cultural resources.

Conclusion. Under this alternative, as much as 3,171 acres of permanent ROW and as much as 1,643 acres of temporary ROW would be required within groundwater development areas. As stipulated in the PA, intensive Class III inventories would be conducted for all groundwater production wells, collector pipelines, and ancillary facilities. Unavoidable adverse effects to historic properties would be mitigated in compliance with the PA. Unanticipated discoveries would be handled as outlined in the PA. Residual impacts would be the same as the Proposed Action.

Groundwater Pumping

The groundwater pumping scenario for Alternative A assumes pumping at reduced quantities (114,755 afy) from those listed on the pending water rights application for the five proposed project pumping basins (Spring, Snake, Delamar, Dry Lake, and Cave valleys). Subsidence could occur as a result of groundwater pumping. Impacts associated with subsidence could include damage to the stratigraphic integrity of subsurface archaeological sites and to historic standing structures. The reader is referred to Section 3.2, Geologic Resources, for an expanded discussion of subsidence and for a list of those areas considered at most risk for subsidence under this alternative.

Conclusion. Subsidence impacts to subsurface archaeological sites and to historic standing structures could occur as a result of groundwater pumping. These types of impacts would be mitigated in accordance with the PA.

3.16.2.11 Alternative B

Groundwater Development Area

Full development of the GWD Project would require groundwater production wells, collector pipelines, and associated facilities. Direct, indirect, and visual impacts to historic properties could occur as a result of constructing these future facilities. Subsurface archaeological sites may be unearthed during project construction activities and result in displacement or loss of associated artifacts or the site itself. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities on cultural resources.

Conclusion. Under this alternative, as much as 3,077 acres of permanent ROW and as much as 1,587 acres of temporary ROW would be required in groundwater development areas. As stipulated in the PA, intensive Class III inventories would be conducted for all groundwater production wells, collector pipelines, and ancillary facilities. Unavoidable adverse effects to historic properties would be mitigated in compliance with the PA. Unanticipated discoveries would be handled as outlined in the PA. Residual impacts would be the same as the Proposed Action.

Groundwater Pumping

The groundwater pumping scenario for Alternative B assumes pumping at the full diversion rates (176,655 afy) listed on the pending water rights application for the five proposed project pumping basins (Spring, Snake, Delamar, Dry Lake, and Cave valleys). Subsidence could occur as a result of groundwater pumping. Impacts associated with subsidence could include damage to the stratigraphic integrity of subsurface archaeological sites and to historic standing structures. The reader is referred to Section 3.2, Geologic Resources, for a list of those areas considered at most risk for subsidence under this alternative.

Conclusion. Subsidence impacts to subsurface archaeological sites and to historic standing structures could occur as a result of groundwater pumping. These types of impacts would be mitigated in accordance with the PA.

3.16.2.12 Alternative C

Groundwater Development Area

Full development of the GWD Project would require groundwater production wells, collector pipelines, and associated facilities. Direct, indirect, and visual impacts to historic properties could occur as a result of constructing these future facilities. Subsurface archaeological sites may be unearthed during project construction activities and result in displacement or loss of associated artifacts or the site itself. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities on cultural resources.

Conclusion. Under this alternative, as much as 3,171 acres of permanent ROW and as much as 1,643 acres of temporary ROW would be required in groundwater development areas. As stipulated in the PA, intensive Class III inventories would be conducted for all groundwater production wells, collector pipelines, and ancillary facilities. Unavoidable adverse effects to historic properties would be mitigated in compliance with the PA. Unanticipated discoveries would be handled as outlined in the PA. Residual impacts would be the same as the Proposed Action.

Groundwater Pumping

Under Alternative C, the maximum pumping rate would be the same as Alternative A (114,755 afy). Subsidence could occur as a result of groundwater pumping. Impacts associated with subsidence could include damage to the stratigraphic integrity of subsurface archaeological sites and to historic standing structures. The reader is referred to Section 3.2, Geologic Resources, for a list of those areas considered at most risk for subsidence under this alternative.

Conclusion. Subsidence impacts to subsurface archaeological sites and historic standing structures could occur as a result of groundwater pumping. These types of impacts would be mitigated in accordance with the PA.

3.16.2.13 Alternative D

Groundwater Development Area

Full development of the GWD Project would require groundwater production wells, collector pipelines, and associated facilities. Direct, indirect, and visual impacts to historic properties could occur as a result of constructing these future facilities. Subsurface archaeological sites may be unearthed during project construction activities and result in displacement or loss of associated artifacts or the site itself. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities on cultural resources.

Conclusion. Under this alternative, as much as 2,635 acres of permanent ROW and as much as 1,370 acres of temporary ROW would be required in groundwater development areas. As stipulated in the PA, intensive Class III inventories would be conducted for all groundwater production wells, collector pipelines, and ancillary facilities. Unavoidable adverse effects to historic properties would be mitigated in compliance with the PA. Unanticipated discoveries would be handled as outlined in the PA. Residual impacts would be the same as the Proposed Action.

Groundwater Pumping

The groundwater pumping scenario for Alternative D assumes that no pumping would occur in Snake Valley, and pumping in Spring Valley would be restricted to the southern portion of the valley within Lincoln County. The maximum groundwater production rate under this scenario is 78,755 afy for the 4 pumping basins (Spring Delamar, Dry Lake, and Cave valleys) is the same as the maximum pumping rate assumed for these basins under Alternatives A, C, and E. Subsidence could occur as a result of groundwater pumping. Impacts associated with subsidence could

include damage to the stratigraphic integrity of subsurface archaeological sites and to historic standing structures. The reader is referred to Section 3.2, Geologic Resources, for a list of those areas considered at most risk for subsidence under this alternative.

Conclusion. Subsidence impacts to subsurface archaeological sites and historic structures could occur as a result of groundwater pumping. These types of impacts would be mitigated in accordance with the PA.

3.16.2.14 Alternative E

Groundwater Development Area

Full development of the GWD Project would require groundwater production wells, collector pipelines, and associated facilities. Direct, indirect, and visual impacts to historic properties could occur as a result of constructing these future facilities. Subsurface archaeological sites may be unearthed during project construction activities and result in displacement or loss of associated artifacts or the site itself. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities on cultural resourcees.

Conclusion. Under this alternative, as much as 2,683 acres of permanent ROW and as much as 1,396 acres of temporary ROW would be required in groundwater development areas. As stipulated in the PA, intensive Class III inventories would be conducted for all groundwater production wells, collector pipelines, and ancillary facilities. Unavoidable adverse effects to historic properties would be mitigated in compliance with the PA. Unanticipated discoveries would be handled as outlined in the PA. Residual impacts would be the same as the Proposed Action.

Groundwater Pumping

The groundwater pumping scenario for Alternative E assumes that no pumping would occur in Snake Valley. The maximum groundwater production rate under this scenario is 78,755 afy for the 4 pumping basins (Spring, Delamar, Dry Lake, and Cave valleys) is the same as the maximum pumping rate assumed for these same basins under Alternatives A, C, and D. Subsidence could occur as a result of groundwater pumping. Impacts associated with subsidence could include damage to the stratigraphic integrity of subsurface archaeological sites and to historic standing structures. The reader is referred to Section 3.2, Geologic Resources, for a list of those areas considered at most risk for subsidence under this alternative.

Conclusion. Subsidence impacts to subsurface archaeological sites and historic standing structures could occur as a result of groundwater pumping. These types of impacts would be mitigated in accordance with the PA.

3.16.2.15 Alternative F

Groundwater Development Area

Full development of the GWD Project would require groundwater production wells, collector pipelines, and associated facilities. Direct, indirect, and visual impacts to historic properties could occur as a result of constructing these future facilities. Subsurface archaeological sites may be unearthed during project construction activities and result in displacement or loss of associated artifacts or the site itself. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities on cultural resources.

Conclusion. Under this alternative, as much as 4,359 acres of permanent ROW and as much as 2,270 acres of temporary ROW would be required in groundwater development areas. As stipulated in the PA, intensive Class III inventories would be conducted for all groundwater production wells, collector pipelines, and ancillary facilities. Unavoidable adverse effects to historic properties would be mitigated in compliance with the PA. Unanticipated discoveries would be handled as outlined in the PA. Residual impacts would be the same as the Proposed Action.

Groundwater Pumping

The groundwater pumping scenario for Alternative F assumes that no pumping would occur in Snake Valley. The maximum groundwater production rate under this scenario is 114,129 afy for the 4 pumping basins (Spring, Delamar, Dry Lake, and Cave valleys). Subsidence could occur as a result of groundwater pumping. Impacts associated with subsidence could include damage to the stratigraphic integrity of subsurface archaeological sites and to historic standing structures. The reader is referred to Section 3.2, Geologic Resources, for a list of those areas considered at most risk for subsidence under this alternative.

Conclusion. Subsidence impacts to subsurface archaeological sites and historic standing structures could occur as a result of groundwater pumping. These types of impacts would be mitigated in accordance with the PA.

3.16.2.16 Comparison of Alternatives

Subsidence impacts to subsurface archaeological sites and standing historic structures could occur as a result of groundwater pumping associated with each alternative. Differences in subsidence risk potential for each alternative are shown in **Table 3.16-3**. As indicated in the table, Alternative B has the highest subsidence risk potential at full build out plus 75 years and full build out plus 200 years, which could potentially result in more impacts to subsurface archaeological sites and historic standing structures.

Table 3.16-3 Comparison by Alternative of Areas (square miles) of Potential Subsidence Greater than 5 Feet

Scenario	Proposed Action	No Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Full Build Out	<1	0	0	3	0	25	0	0
Full Build Out Plus 75 Years	147	0	5	172	<1	152	5	71
Full Build Out Plus 200 Years	525	0	159	669	1	269	153	242

Cumulative Impacts

mpacts Common to All Alternatives

ge Effects

e already appears to be influencing both natural and managed ecosystems of the Americ
l. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of t
e change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the
ost rapid in the nation, significantly more than the global average in some areas (US
ggest continued strong warming in the region, with significant increases in temperature (US
in precipitation (Seager et al. 2007). A warmer atmosphere and an intensified water cycl
a greater likelihood of drought for the Southwest, but also an increased risk of floodi
r variability in patterns of precipitation can be anticipated in the future. In the coming
ature could increase significantly, with an associated increase in both the frequency of e
droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling &
al. 2009). Under such conditions, future impacts could be substantial for some resourc
rotected areas, and agricultural lands.

nge Effects to Cultural Resources

ge effects were not evaluated for this resource because potential effects to cultural resource
e cannot be directly quantified.

Issues

y and Groundwater Development Area Construction and Maintenance

damage to and loss of historic properties and other cultural resources may have already

tion of the GWD Project and its associated facilities may result in incremental loss of hist
cultural resources in addition to PPAs.

ave the potential to cause the loss of historic properties and other cultural resources.

y undiscovered archaeological deposits, including burials and associated funerary obj
ed and directly affected during ground-disturbing activities that are associated with project c

indirect effects, such as unauthorized artifact collection and vandalism, could occur.

ion of visual or auditory elements could diminish the integrity of a historic property, includ

r Pumping

ce associated with groundwater pumping could adversely affect subsurface archaeolo
tanding structures.

Assumptions

y and Groundwater Development Area Construction and Maintenance

III inventory will be conducted within the APE for direct effects and all sites located durin
valuated for eligibility to the NRHP.

- A Notice to Proceed will be issued after the BLM, in consultation with the SHPO, identified Indian tribes, and other consulting parties, determines that an appropriate treatment plan has been implemented; the fieldwork phase of the treatment plan has been completed; and, the BLM has accepted a summary description of the fieldwork performed and a reporting schedule for that work, in accordance with the terms of the PA.

Groundwater Pumping

Subsidence impacts to NRHP-eligible historic standing structures and subsurface archaeological sites could occur.

3.16.3.4 Methodology for Analysis

Rights-of-way and Groundwater Development Area Construction and Maintenance

- Review the PPAs and RFFAs and assess the level of incremental impacts that the proposed GWD Project is likely to incur on historic properties and other cultural resources in the defined cumulative effects study area.
- Potential effects are quantified where possible. Where quantitative data (i.e., site totals) are unavailable, best professional judgment or qualitative assessments are used to describe impacts.
- The analysis of potential adverse effects to historic properties was based on the "criteria of adverse effects." Under section 106 of the NHPA, potential impacts to historic properties are assessed by using the "criteria of adverse effect" (36 CFR 800.5[a][1]): "An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association."

Groundwater Pumping

- No data is available on the numbers and types of historic properties and other cultural resources that could be affected by groundwater pumping. Best professional judgment or qualitative assessments are used to describe impacts.
- Subsidence impacts to historic properties would be assessed by using the "criteria of adverse effect."

3.16.3.5 No Action

Groundwater Development

Under the No Action Alternative, the proposed GWD Project would not be constructed or maintained. No project-related surface disturbance or visual intrusions associated with the transmission line and other above-ground structures would occur. Natural events such as fire, wind, rain, and land use activities such as grazing and agriculture would continue to affect historic properties and other cultural resources. Management activities on public lands would continue to be directed by historic preservation laws, the Nevada State Protocol, and the Ely and Las Vegas RMPs, which would involve measures to preserve and protect historic properties and other cultural resources.

Groundwater Pumping

Under the No Action Alternative, existing groundwater pumping would continue, and could result in areas of subsidence within hydrographic basins that currently are experiencing pumping, and where pumping from foreseeable future projects may occur. As such, cumulative effects to historic properties and other cultural resources as a result of subsidence would be expected to occur, although to a lesser degree, under the No Action Alternative.

3.16.3.6 Proposed Action

Rights-of-way and Groundwater Development Area Construction and Maintenance

The cumulative effects study area for cultural resources corresponds to the area within the groundwater modeling boundary (see **Figure 3.3.1-1** in Section 3.3, Water Resources). PPAs and RFFAs are identified in **Tables 2.9-1** through **2.9.2**, and **Figures 2.9-1** and **2.9-2**. It is unknown as to the number of historic properties and other cultural resources that have been adversely affected by PPAs, and would be adversely affected by RFFAs. As such, the following analysis of cumulative impacts to historic properties and other cultural resources is a qualitative assessment rather than a quantitative assessment.

PPAs consist primarily of existing roads, energy utility corridors, mining districts, and recent wildfires (**Figure 2.9-1**). Other activities that have affected cultural resources include livestock grazing over nearly all public lands and the development of towns and rural communities (Ely, McGill, Baker, Garrison, Pioche, and Panaca). The primary future actions consist of construction of new utilities (pipelines and electrical transmission lines), roads and turbine pads for wind energy projects, which would be located in Spring and Lake valleys. The total estimated surface disturbance for construction and maintenance of the main pipeline and ancillary facilities, plus the anticipated groundwater development facilities would be up to 20,570 acres, which potentially would overlap with PPAs and RFFAs in the cumulative effects study area.

As directed by law, cultural resources inventories are conducted for any actions (e.g., wind farms, transmission lines) involving public lands, and adverse effects to historic properties avoided or mitigated as appropriate. Avoidance through project redesign is the preferred method of mitigation; however, when avoidance is not feasible, data recovery (archaeological excavation) or other forms of mitigation are implemented prior to ground-disturbing activities

The types of impacts that have occurred and could occur as a result of the proposed GWD Project and the above-mentioned actions include direct, indirect, and visual impacts. As stated previously in Section 3.16.2.2, direct impacts are associated with physical disturbance that can directly damage or destroy known and unknown (buried) historic properties and other cultural resources. Indirect impacts occur later in time or are farther removed in distance (e.g., erosion, vandalism, and illegal collecting of artifacts as a result of increased access). Visual impacts are associated with visual intrusions such as electrical transmission lines or other above-ground structures.

In order to analyze cumulative impacts, impacts first must be identified for the proposed GWD Project before cumulative impacts with PPAs and RFFAs can occur. As such, the cumulative impact analysis should be linked to impacts associated with the proposed GWD Project. Without an impact, there would be no impacts to "add to" the potential impacts of other PPAs and RFFAs. As identified in Section 3.16.2.2, impacts to historic properties and other cultural resources as a result of the proposed GWD Project include direct impacts to known and unknown historic properties and other cultural resources during ground-disturbing project activities; indirect impacts, such as soil compaction, off-road vehicle traffic associated with construction or maintenance activities, flooding/erosion (associated with a rupture), inadvertent damage to cultural sites, and illegal artifact collection; and, visual impacts to historic properties where setting is an aspect of integrity.

Impacts associated with construction and operation of the TransWest Express, Zephyr, and ON Transmission Line Projects and Spring Valley and Wilson Creek wind projects would be similar to those identified for the GWD Project. The effects of these projects combined with the proposed GWD Project would be a long-term cumulative loss of historic properties and other cultural resources. As stated previously, direct impacts to known historic properties would be avoided or, if avoidance is not feasible, mitigated through data recovery or other appropriate means of mitigation. Data recovery recovers a significant amount of data, which are then integrated into the regional archaeological database; however, the site ultimately is destroyed by the project. Over time, this represents a long-term cumulative loss. Indirect effects of these projects also would be similar to the proposed GWD Project. Incremental damage to cultural sites or loss of artifacts through increased access and increased numbers of people in the cumulative effects study area would occur over the life of these projects. Installation of transmission line structures and wind turbines would cumulatively impact historic properties in which setting is an important aspect of integrity. These projects when combined with the proposed GWD Project would cumulatively alter the landscape surrounding these types of properties to the point where the integrity of the setting would no longer contribute to the eligibility of the site. Cumulative visual impacts would occur over the life of the projects.

The GWD Project groundwater development area in northern Spring Valley would overlap with the Spring Valley Wind Project near the intersection of Highway 93 and Highways 6 and 50 west of GNBP. The proposed GWD Project would add access roads, water gathering pipelines, and electrical service to well sites with areas currently proposed for wind turbines. Since the specific locations of the proposed GWD Project wells have not been determined, there would be an opportunity to share the wind energy project's road system to reduce the cumulative surface disturbance area of the two projects.

Cumulative direct and indirect effects associated with the Coyote Springs Development would be similar to those described for the wind and transmission line projects. However, cumulative visual impacts to historic properties in

which setting is an important aspect of integrity would be less since the proposed development would not be as visually intrusive as transmission line structures and wind turbines.

In summary, direct cumulative effects would occur as a result of the proposed GWD Project when combined with PPAs and RFFAs located in the cumulative effects study area in which surface disturbance has occurred and would occur. These types of impacts would be minimized or mitigated through data recovery or other appropriate mitigation measures in compliance with historic preservation laws. As a result of data recovery, cumulative benefits would occur as recovered site data are integrated into the regional archaeological database. However, the sites ultimately are destroyed, resulting in long-term cumulative loss. Indirect effects are difficult to mitigate as most of the damage has occurred by the time it is discovered. Indirect effects, such as illegal collecting of artifacts, have occurred and most likely would continue to occur in the cumulative effects study area through increased access and development, and increased human presence, as a result of the proposed GWD Project combined with PPAs and RFFAs. Cumulative visual effects to historic properties and properties of traditional religious and cultural importance to Native Americans where the setting is an important aspect of integrity are expected to occur. The proposed GWD Project combined with PPAs and RFFAs have altered and most likely would continue to alter the landscape surrounding these properties. The incremental loss of integrity would diminish the values that make these properties significant.

Groundwater Pumping Effects

Currently, no information is available on the numbers and types of sites or structures that have been or could be adversely affected by subsidence in the cumulative effects study area. Therefore, no quantitative assessment of cumulative effects to these resources can be provided at this time. Subsidence as a result of groundwater pumping potentially could adversely affect the stratigraphic integrity of subsurface archaeological sites and damage or destroy historic standing structures. Impacts to these sites or structures would be mitigated on a case-by-case basis as discovered. However, if these sites are not located in proposed disturbance areas, most likely they would not be recorded and evaluated during Class III inventories. As such, any measures to mitigate effects of subsidence may prove ineffective. **Table 3.16-4** summarizes the potential subsidence area resulting from groundwater pumping from the Proposed Action and other cumulative sources over the three time frames.

Table 3.16-4 Summary of Cumulative Potential Subsidence Impacts for the Proposed Action Pumping

Impact Indicators By Model Timeframe	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Subsidence greater than 5 feet (square miles)	76	283	781

3.16.3.7 Alternative A

Rights-of-way and Groundwater Development Area Construction and Maintenance

Under Alternative A, cumulative effects to historic properties as a result of ROWs and groundwater development area construction and maintenance would be the same as described for the Proposed Action.

Groundwater Pumping Effects

Cumulative effects to historic properties and other cultural resources as a result of subsidence associated with groundwater pumping would be the similar to those described for the Proposed Action. **Table 3.16-5** summarizes the potential subsidence area resulting from groundwater pumping from Alternative A and other cumulative sources over the three time frames.

Table 3.16-5 Summary of Cumulative Potential Subsidence Impacts for Alternative A Pumping

Impact Indicators By Model Timeframe	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Subsidence greater than 5 feet (square miles)	76	131	349

3.16.3.8 Alternative B

Rights-of-way and Groundwater Development Area Construction and Maintenance

Under Alternative B, cumulative effects to historic properties as a result of ROWs and groundwater development area construction and maintenance would be the same as described for the Proposed Action.

Groundwater Pumping Effects

Cumulative effects to historic properties and other cultural resources as a result of subsidence associated with groundwater pumping would be the similar to those described for the Proposed Action. **Table 3.16-6** summarizes the potential subsidence area resulting from groundwater pumping from Alternative B and other cumulative sources over the three time frames.

Table 3.16-6 Summary of Cumulative Potential Subsidence Impacts for Alternative B Pumping

Impact Indicators By Model Timeframe	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Subsidence greater than 5 feet (square miles)	78	323	956

3.16.3.9 Alternative C

Rights-of-way and Groundwater Development Area Construction and Maintenance

Under Alternative C, cumulative effects to historic properties as a result of ROWs and groundwater development area construction and maintenance would be the same as described for the Proposed Action.

Groundwater Pumping Effects

Cumulative effects to historic properties and other cultural resources as a result of subsidence associated with groundwater pumping would be the similar to those described for the Proposed Action. **Table 3.16-7** summarizes the potential subsidence area resulting from groundwater pumping from Alternative C and other cumulative sources over the three time frames.

Table 3.16-7 Summary of Cumulative Potential Subsidence Impacts for Alternative C Pumping

Impact Indicators By Model Timeframe	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Subsidence greater than 5 feet (square miles)	76	126	167

3.16.3.10 Alternative D

Rights-of-way and Groundwater Development Area Construction and Maintenance

Under Alternative D, cumulative effects to historic properties as a result of ROWs and groundwater development area construction and maintenance are expected to be less than for the Proposed Action because there would be no surface disturbance in White Pine County.

Groundwater Pumping Effects

Cumulative effects to historic properties and other cultural resources as a result of subsidence associated with groundwater pumping would be the similar to those described for the Proposed Action. **Table 3.16-8** summarizes the potential subsidence area resulting from groundwater pumping from Alternative D and other cumulative sources over the three time frames.

Table 3.16-8 Summary of Cumulative Potential Subsidence Impacts for Alternative D Pumping

Impact Indicators By Model Timeframe	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Subsidence greater than 5 feet (square miles)	88	281	560

3.16.3.11 Alternative E

Rights-of-way and Groundwater Development Area Construction and Maintenance

Under Alternative E, cumulative effects to historic properties as a result of rights-of-way and groundwater development area construction and maintenance are expected to be less than for the Proposed Action because there would be no surface disturbance in Snake Valley.

Groundwater Pumping Effects

Cumulative effects to historic properties and other cultural resources as a result of subsidence associated with groundwater pumping would be the similar to those described for the Proposed Action. **Table 3.16-9** summarizes the potential subsidence area resulting from groundwater pumping from Alternative E and other cumulative sources over the three time frames.

Table 3.16-9 Summary of Cumulative Potential Subsidence Impacts for Alternative E Pumping

Impact Indicators By Model Timeframe	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Subsidence greater than 5 feet (square miles)	76	131	336

3.16.3.12 Alternative F

Rights-of-way and Groundwater Development Area Construction and Maintenance

Under Alternative F, cumulative effects to historic properties as a result of rights-of-way and groundwater development area construction and maintenance would be the same as described for Alternative E.

Groundwater Pumping Effects

Cumulative effects to historic properties and other cultural resources as a result of subsidence associated with groundwater pumping would be the similar to those described for the Proposed Action. **Table 3.16-10** summarizes the potential subsidence area resulting from groundwater pumping from Alternative F and other cumulative sources over the three time frames.

Table 3.16-10 Summary of Cumulative Potential Subsidence Impacts for Alternative F Pumping

Impact Indicators By Model Timeframe	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Subsidence greater than 5 feet (square miles)	76	208	477

BLM

2012

3.17 Native American Traditional Values

3.17.1 Affected Environment

3.17.1.1 Overview

Ethnographic resources are associated with the cultural practices, beliefs, and traditional history of a community. Examples of ethnographic resources include places in oral histories or traditional places, such as particular rock formations, the confluence of two rivers, or a rock cairn; large areas, such as landscapes and viewscapes; sacred sites and places used for religious practices; social or traditional gathering areas, such as dance areas; natural resources, such as plant materials or clay deposits used for arts, crafts, or ceremonies; and places and natural resources traditionally used for non-ceremonial uses, such as trails or camping locations.

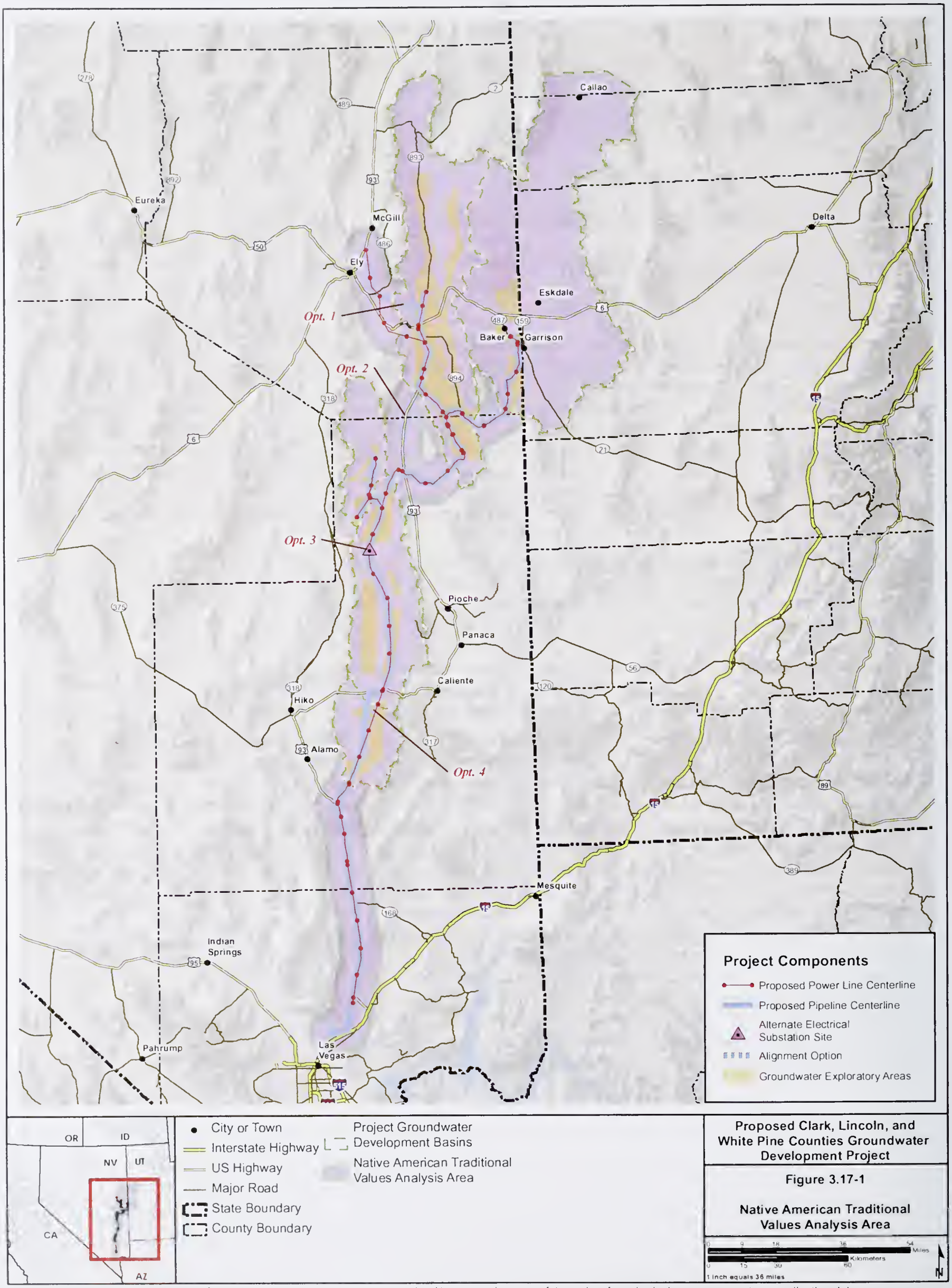
To ensure proper coverage of areas of tribal importance that may be affected by the proposed GWD Project, the BLM requested that the analysis area extend beyond the proposed pipeline ROW. The analysis area for Native American traditional values encompasses 5 hydrologic basins (Spring, Snake, Delamar, Dry Lake, and Cave valleys) and a 10-mile-wide corridor centered on the proposed pipeline routes where the routes extend outside of the hydrologic basins (**Figure 3.17-1**). The cumulative effects study area is the same as the analysis area.

Regulatory Framework

Federal law and agency guidance require the BLM to consult with Native American tribes concerning the identification of cultural values, religious beliefs, and traditional practices of Native American people that may be affected by actions on BLM-administered lands. This consultation includes the identification of places (i.e., physical locations) of traditional cultural importance to Native American tribes. Places that may be of traditional cultural importance to Native American people include, but are not limited to, locations associated with the traditional beliefs concerning tribal origins, cultural history, or the nature of the world; locations where religious practitioners go, either in the past or the present, to perform ceremonial activities based on traditional cultural rules or practice; ancestral habitation sites; trails; burial sites; and places from which plants, animals, minerals, and waters possessing healing powers or used for other subsistence purposes, may be taken. Some of these locations may be considered sacred to particular Native American individuals or tribes.

Quick Reference

AIRFA – American Indian Religious Freedom Act
ARPA – Archaeological Resources Protection Act
BIA – Bureau of Indian Affairs
EO – Executive Order
NAGPRA – Native American Graves Protection and Repatriation Act
NAM – Native American
NEPA – National Environmental Policy Act
NHPA – National Historic Preservation Act
NPS – National Park Service
NRHP – National Register of Historic Places
PA – Programmatic Agreement
PRCS – Properties of Religious and Cultural Significance
RFFA – Reasonably Foreseeable Future Actions
RFRA – Religious Freedom Restoration Act
RMP/EIS – Resource Management Plan/Environmental Impact Statement
SHPO – State Historic Preservation Office
TCP – Traditional Cultural Property



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

In 1992, the NHPA was amended to explicitly allow that "properties of traditional religious and cultural importance to an Indian tribe may be determined to be eligible for inclusion on the NRHP," and that in carrying out its responsibilities under section 106 of the NHPA, a federal agency will consult with any Indian tribe that attaches religious and cultural significance to such properties.

If a resource has been identified as having importance in traditional cultural practices and the continuing cultural identity of a community, it may be considered a TCP. The term "traditional cultural property" first came into use within the federal legal framework for historic preservation and cultural resource management in an attempt to categorize historic properties containing traditional cultural significance. National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties (Parker and King 1998) defines a TCP as "one that is eligible for inclusion on the NRHP because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community." To qualify for nomination to the NRHP, a TCP must be more than 50 years old, must be a place with definable boundaries, must retain integrity, and must meet certain criteria as outlined for cultural resources in National Register Bulletin 38.

Examples of TCPs include:

- A rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents;
- An urban neighborhood that is the traditional home of a particular cultural group, and that reflects its beliefs and practices;
- A location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining it historic identity; and
- A location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world (NPS 1998).

In addition to NRHP eligibility, some places of cultural and religious importance to the tribes also must be evaluated to determine if they should be considered under other federal laws or EOs. These include, but are not limited to, the NAGPRA, AIRFA, ARPA, EO 13007 (Sacred Sites) of 1996, and the RFRA.

The NAGPRA established a means for Native Americans, including Indian Tribes, to request the return of human remains and other sensitive cultural items held by federal agencies or federally assisted museums or institutions. NAGPRA also contains provisions regarding the intentional excavation and removal of, inadvertent discovery of, and illegal trafficking in Native American human remains and sensitive cultural items.

The AIRFA established federal policy for protecting and preserving the inherent right of individual Native Americans to believe, express, and exercise their traditional religions including, but not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

The ARPA made it illegal to excavate or remove from federal or Indian lands any archaeological resources without a permit from the land manager. Permits may be issued only to educational or scientific institutions, and only if the resulting activities will increase knowledge about archaeological resources. Major penalties for violating the law include both fines and imprisonment.

EO 13007 requires federal agencies to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions to: 1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners; and 2) avoid adversely affecting the physical integrity of such sacred sites. It also requires agencies to develop procedures for reasonable notification of proposed actions or land management policies that may restrict access to or ceremonial use of, or adversely affect, sacred sites. Sacred sites are defined in the executive order as "any specific, discrete, narrowly delineated location on federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site." It should be noted that a

sacred site may not meet the National Register criteria for a historic property and, conversely, a historic property may not meet the criteria for a sacred site.

The RFRA is a 1993 U.S. federal law aimed at preventing laws that substantially burden a person's free exercise of their religion.

Indian Trust Assets (ITAs) are legal interests in property held in trust by the U.S. for Indian Tribes or Indian individuals. The Secretary of the Interior, acting as the trustee, holds many assets in trust. Examples of objects that may be trust assets are lands, minerals, hunting and fishing rights, and water rights. While most ITAs are on reservations, they also may be found off-reservations. The U.S. has an Indian trust responsibility to protect and maintain rights reserved by or granted to Indian Tribes or Indian individuals by treaties, statutes, and EOs. These sources of trust responsibility are sometimes further interpreted through court decisions and regulations. Management of ITAs is based on, but not limited to, the following EOs and memorandums:

EO 13175, Consultation and Coordination with Indian Tribal Governments, 63 F.R. 96 (November 6, 2000). EO 13175 was issued to establish regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications. When implementing such policies, agencies shall consult with tribal officials as to the need for federal standards and any alternatives that limit their scope or otherwise preserve the prerogatives and authority of Indian tribes.

Government-to-Government Relations with Native American Tribal Governments (Memorandum signed by President Clinton, April 29, 1994), 59 Federal Register 22951 (May 4, 1994). The Memorandum directs federal agencies to consult, to the greatest extent practicable and to the extent permitted by law, with tribal governments prior to taking actions that affect federally recognized tribal governments. Federal agencies must assess the impact of federal government plans, projects, programs, and activities on tribal trust resources and assure that tribal government rights and concerns are considered during such development.

Secretarial Order No. 3175 – Departmental Responsibilities for Indian Trust Resources. Secretarial Order 3175 requires interior bureaus and offices to consult with the recognized tribal government with jurisdiction over the trust property that a proposal may affect.

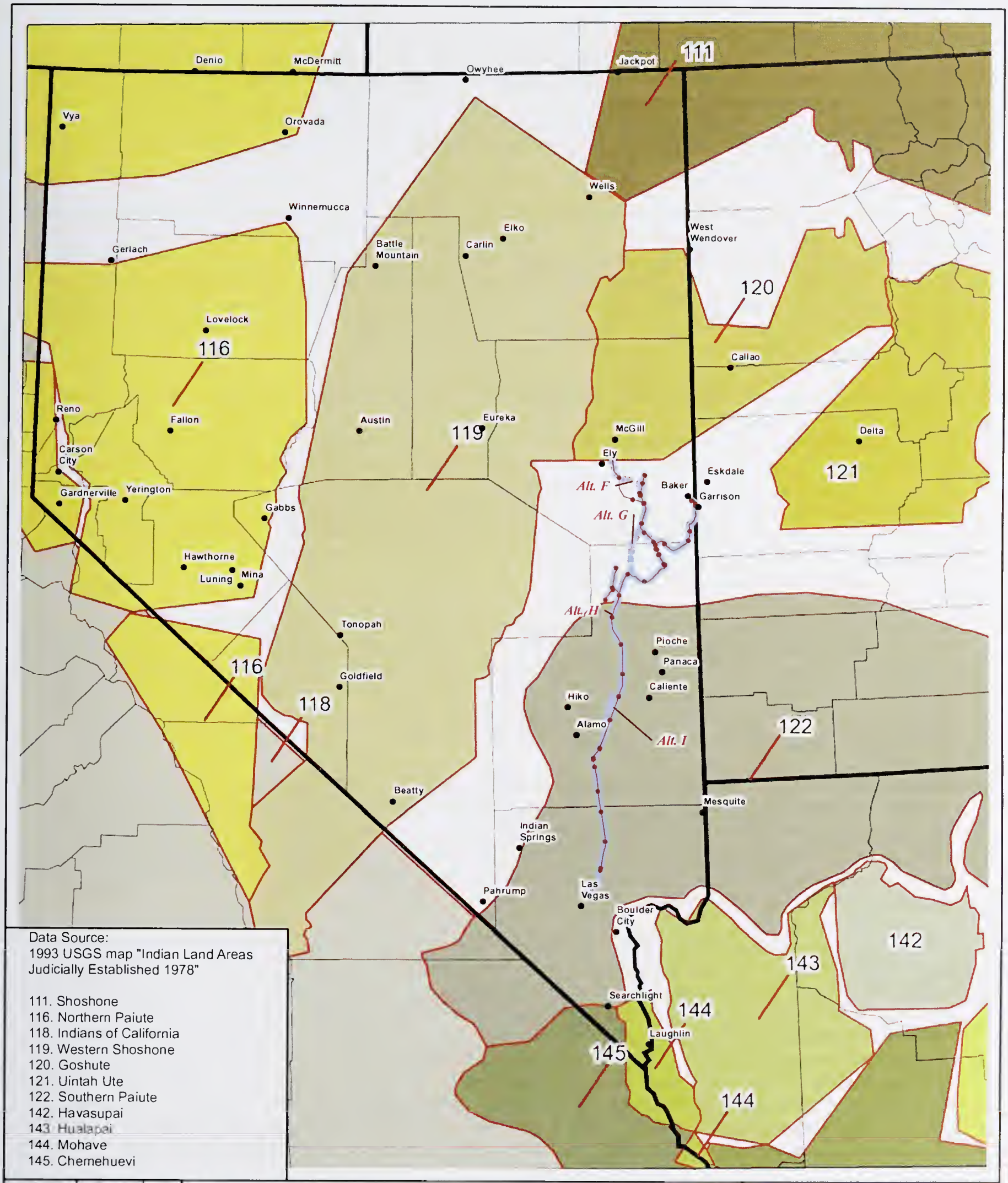
To provide clarification and avoid confusion in the following discussions, this EIS utilizes the term "properties of religious and cultural significance" (PRCS) to denote the general category of places that are culturally or spiritually significant to Native American tribes. The term "traditional cultural property" (TCP) is used to designate those locations that may be eligible for nomination to the NRHP. "Sacred sites" denote locations that warrant protection under EO 13007.

Ethnographic Overview

The tribes known to have inhabited the analysis area were Western Shoshones and Southern Paiutes. It is believed that these Numic-speaking people entered what is now known as Nevada between 1,000 to 5,000 years ago (Madsen and Rhode 1994). It is generally thought by scholars and is related in various Native American oral histories that these people came from the western coastal area. Many of today's Paiute and Shoshone say they have been here since time immemorial. **Figure 3.17-2** shows judicially established Indian lands in the proposed GWDP vicinity.

Western Shoshone

Shoshone people once inhabited an enormous geographical region that included territories in parts of present-day California, Montana, Idaho, Nevada, Utah, and Wyoming. For purposes of academic study, Julian Steward (1938) and other anthropologists divided the Shoshone into three groups based on territorial occupations: Western Shoshone (including the Goshute), Northern Shoshone and Bannock, and Eastern Shoshone. Linguistically, these bands of extended families shared a similar but dialectically diverse language classified by linguists as "Shoshonean," part of the Central Numic branch of the large Uto-Aztecan language family (Thomas et al. 1986). Western Shoshone call themselves "Newe" or "the People." The analysis area includes the traditional territories of the Western Shoshone people who now live on reservations or within tribal colonies throughout the Great Basin and California.



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Western Shoshone first felt the negative impacts of European settlers when Ute slave traders raided their traditional lands and sold captives to the New Mexico colonial settlers (Defa 2000). Western Shoshone groups came into closer contact with European traders and trappers in the 1820s, but early contact with these men had little effect on Goshute culture (Thomas et al. 1986). The Western Shoshone and Goshute were heavily affected by the encroachment of Mormons into their traditional territory and by the California gold rush traffic during the late 1840s and early 1850s (Thomas et al. 1986).

In August 1855, the first treaty with the Western Shoshone was signed but was never ratified by Congress. As a result, the U.S. Government never recognized it although the Western Shoshone accepted and continued to hold to the treaty. In 1863, another treaty (Treaty of Ruby Valley) was signed with three Bannock bands and one Western Shoshone band and later ratified by the U.S. Government. The Treaty of Ruby Valley anticipated economic development and population changes as a result of White settlement, and stipulated terms of compensation for damages as a result of encroachment by non-Native communities. Additionally, the Treaty mapped out Western Shoshone territory and stipulated the creation of reservations for Western Shoshone Bands.

In 1877, the government set aside lands for a reservation on the state line between Nevada and Idaho near Duck Valley, Idaho, and another at Carlin Farms near the towns of Carlin and Elko, Nevada. Carlin Farms eventually was reclaimed by non-natives, and the Duck Valley Reservation became home for only a quarter of the 4,000 Western Shoshone that were expected to relocate to reservation lands. By 1884, only about 300 Western Shoshone families remained at the Duck Valley Reservation (Crum et al. 1976, cited in Woods 2003; Powell and Ingalls 1873, as cited in Woods 2003). Several Western Shoshone reservations were established in the 1900s: Elko Colony, Elko, Nevada (1918 - eventually moved to another location on the north side of Elko); Duckwater Reservation, Duckwater, Nevada (1940 - expanded in 1943 and again in 1951 for a total of 15,000 acres); South Fork Reservation (1941); Ely Colony (1931 - expanded in 1977 from 10 to 100 acres) (Crum et al. 1976, cited in Woods 2003).

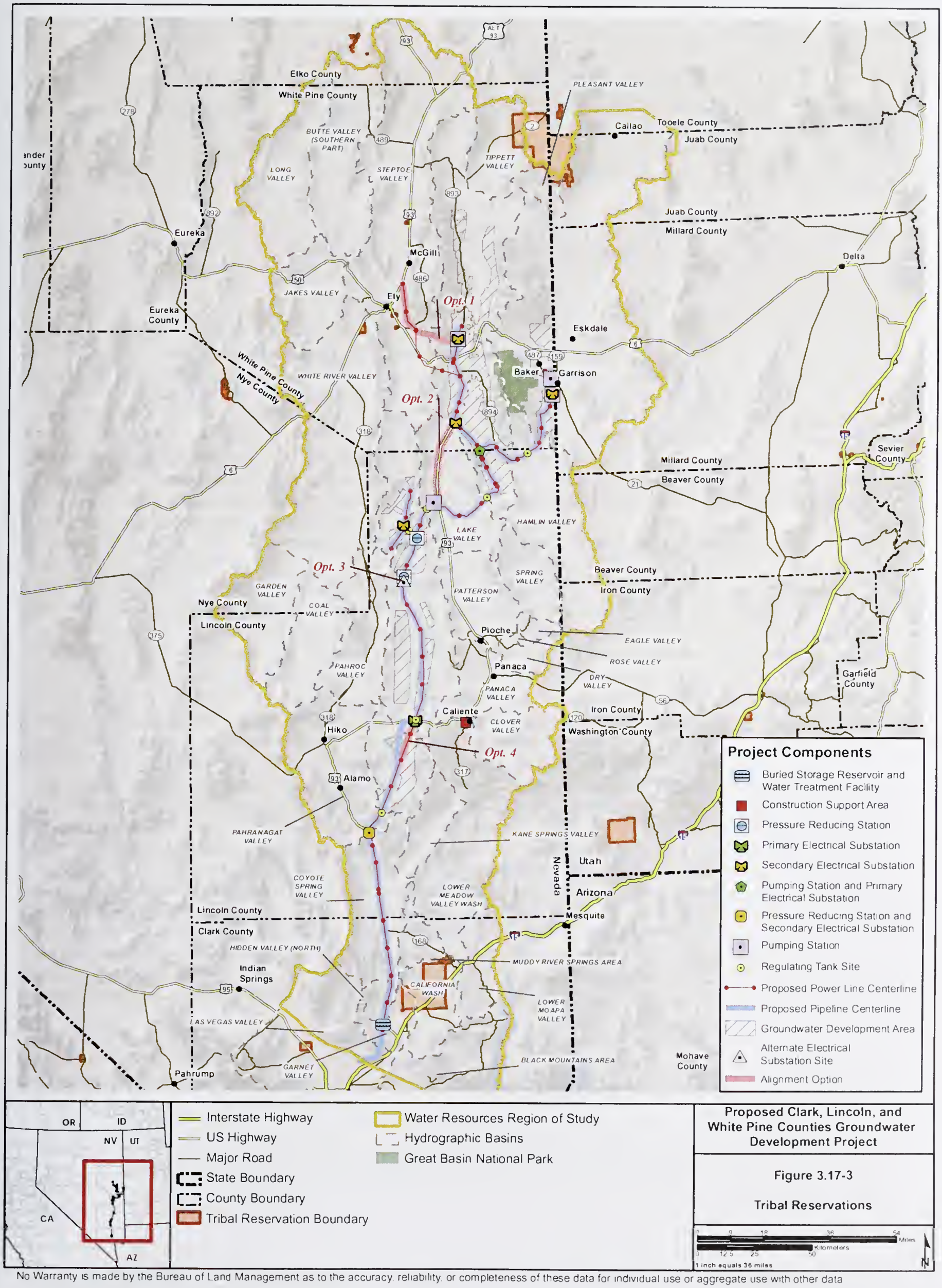
In the 1930s, the South Fork, Wells, Elko, and Battle Mountain bands organized as the Te-Moak Bands of Western Shoshone Indians, which was federally recognized in 1938. Colonies eventually were established for each band. The Indian Claims Commission considered the Goshute to be a separate landholding entity in 1962 (Stewart 1980; Thomas et al. 1986). Today, two reservations have been established for the Goshute; one is located in eastern Nevada at the base of the Deep Creek Mountains, east of Antelope Valley, and the other is located in Skull Valley, just south of Salt Lake City, Utah. **Figure 3.17-3** shows tribal reservation boundaries relative to the proposed GWD Project facilities.

Many Western Shoshone continued to live in traditional bands within their ancestral areas, including Diamond and Pine valleys. Some traditional activities, such as bartering pine nuts and selling baskets, generated modest income and reinforced cultural identity. During the early part of the 20th Century, fandangos (i.e., multi-day cultural celebrations featuring traditional foods, round dances, songs, and hand games) provided a forum for socializing, political discussion, and elections. In later years, the fandango incorporated rodeo and baseball and became associated with federal holidays such as the Fourth of July and Labor Day.

In his archival research and fieldwork on the Great Basin native people, Julian Steward (1938) identified many Western Shoshone and Goshute villages consisting of one to six families within the analysis area. Steward's (1938) village locations document a significant number and type of subsistence activities in Spring Valley, including pine nut gathering, and antelope, deer, rabbit and mud hen hunting. The variety of subsistence activities conducted in Spring Valley points out that it was intensively and extensively used, and represented a very important economic area to the Western Shoshone and Goshute (Lahren 2010). Steward believed that village sites were comprised of Western Shoshone families, and to depict their locations, he hand drew regional maps with their locations. Modern day interpretations of these maps place the villages within parts of southern Spring and Snake valleys. Steward's data also documents intensive religious use of the Swamp Cedar area by the Western Shoshone and Goshute. Oral history accounts indicate continued use of Spring Valley and the Swamp Cedars area up to the present (Lahren 2010).

Habitation Patterns

Due to the highly mobile lifestyle of the Western Shoshone, typical homes were temporary, simple structures made of nearby resources such as sagebrush, tree limbs, and bark. A winter house common to the Western Shoshone was a conical hut (wickiup) that housed as many as six family members. The Goshute also lived in caves, rock shelters, and desert brush structures. Families moved in groups and formed winter villages near food caches (Thomas et al. 1986).



Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure 3.17-3

Tribal Reservations

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Subsistenee

Sinee the traditional territory of the Western Shoshone and Goshute was so large, families were able to utilize a great variety of plant and animal resources, most of which were tied to speeific loeations and seasons. This led to a migration system whereby families basieally followed the seasonal resourees as they beeame available (Thomas et al. 1986). Small family groups usually returned to favorite gathering areas and hunting areas from spring to fall. During the winter months, families would gather into groups and form villages loeated in relativcly warm areas near food caches (Steward 1938; Thomas et al. 1986).

As hunters and gatherers, Shoshone and Goshute people maintained a diet that was similar to that of other Great Basin groups. Seeds, roots, pine nuts, mesquite beans, cactus meat, and gourds were some of the most utilized plant food sourees (Steward 1938). Wild game that were hunted ineluded mountain sheep, antelope, deer, mountain lions, wolves, rabbits, wildeats, rodents, some reptiles and fish, and a variety of birds (Egan 1917; Fremont 1845; Powers 1877; Simpson 1983; Steward 1940, 1941, 1938; Stewart 1980). Antelope and rabbit drives involvcd the eommunal efforts of Western Shoshone families, and were highly ritualistie (Egan 1917; Steward 1940, 1941, 1938). The Goshute were ealled "Digger Indians" because they dug for many of their staple food sources sueh as roots, tubers, bulbs, and even small animals. Insects, sueh as grasshoppers, also were eonsumed. The Goshute were highly adapted to the desert environment and processed over 80 doeumented speeies of vegetable foods, including seeds, greens, berries, roots, and pine nuts (Defa 2000).

Typieally, women were responsible for seed and nut gathering and proeessing, food preparation, and making baskets, pottery, and some elothing items (Steward 1938). Men usually hunted large game, making flint points, digging stieks, and rabbit skin blankets. Men also assisted women with hunting rodents, carrying wood and water, transporting seeds, and gathering some materials for making pots, baskets, and mctates. Both men and women participated in fishing aetivities. Children also were expeeted to help with many of the aetivities (Steward 1938).

Pine nut gathering was a significant fall event for Shoshone families that used to inhabit most of the geographic basins within the analysis area. Pine nuts were gathered in Cave Valley from the Ely Mountains, around Mount Grafton, and as far south as Willow Creek (Steward 1938). Steward notes that pine nuts were gathered near all village sites within Spring and Snake valleys. Families gathered independently of eaeh other and often stored harvests in private loeations.

Religion and Ceremonies

Western Shoshone religion revolved around direct relations with the supernatural, including shamanism and the interpretation of dreams. A formal priesthood is not thought to have existed within the Western Shoshone eulture, but three types of shamans and two types of dream states have been documented (Thomas et al. 1986). Rituals often involved singing and were elosely tied to subsistenee strategies, such as antelope hunts, rabbit and deer drives, and even grasshopper drives (Thomas et al. 1986; Defa 2000). The Shoshone had few group eeremonial aetivities such as danees, although the Round Danee was praetieed by some Shoshone groups (Thomas et al. 1986). The Round Dance was deseribed by Steward (1941) as a "distinctively Shoshonean danee" that typieally was performed during festivals. Aeeording to Woods (2003), Goshute religion and spiritual life basieally was the same as that of the Western Shoshone, although there were some differenees that were attributed to the harsh desert environment of Goshute territory.

Western Shoshone and Goshute burial customs varied. Cremation was widely praetieed in Death Valley and loeations in Nevada. In other areas, the dead were buried in rock slides and talus slopes (Thomas et al. 1986). The Goshute also eremated the deceased, sometimes in their dwelling, along with possessions (Driver 1937). Goshute burials also have been found in eaves or exeavated pits (Driver 1937; Niekens 1984).

Oral Traditions

Oral traditions are eentral to Western Shoshone and Goshute people as they are one way of passing eultural traditions from generation to generation. Like other Numie speakers, the Western Shoshone and Goshute had oral traditions that centered on Wolf and Coyote. In Shoshone myths and legends, Wolf is eharaeterized as being a godly, wise, and paternalistie figure, while Coyote is the triekster and sometimes malevolent figure (Crum et al. 1976, cited in Woods 2003). Hero legends have been documented in Goshute folklore that glorify individuals or Goshute families at the expense of their enemies.

Southern Paiute

The traditional territories of the Southern Paiute extended across southern Utah and Nevada, northern Arizona, and down along the western side of the Colorado River to present-day Blythe, California. Kelly and Fowler (1986) listed at least 16 Southern Paiute groups or bands that each had their own territories within these lands. Martineau (1992) recorded the names of 29 bands, many of which no longer exist. The Inter-Tribal Council of Nevada (1976) listed 19 bands. Of these bands, those whose traditional lands are located within or nearest the analysis area are the Moapa, Las Vegas, and Chemehuevi bands.

Although considered to be the territory of the Las Vegas band, the Las Vegas area, "was apparently an area shared by many regional Native Americans on a cooperative basis and not considered the property or territory of any single group" (Haarklau 1999; Inter-Tribal Council of Nevada 1976; Jensen 1926). The area was a stopover and gathering site for many different bands of Southern Paiute. The Inter-Tribal Council of Nevada (1976) states, "Las Vegas always had been used and often occupied by various different Nuwuvi bands." Southern Paiute call themselves "Nuwuvi" meaning "the people."

Habitation Patterns

Like other Numic tribes in the past, the Southern Paiute were hunters and gatherers and generally migrated on a seasonal basis within particular band territories. These annual cycles differed among bands based on environmental conditions. Some preferred to spend the winter at high elevations; others wintered at the base of hills or in protected canyons. Some Southern Paiute bands chose to live in caves; others lived in conical brush shelters called wickiups. In the summertime, many Southern Paiute families lived among the trees under shades made of brush (Kelly and Fowler 1986). The favored semi-permanent campsites were at the bases of scarps or lower slopes near water sources and juniper stands (Kelly 1964). During earlier times, Southern Paiute house types consisted of the wickiup, a dome-shaped structure made of posts and covered with grass and bark, a circular enclosure made of brush, and a rectangular shade consisting of a flat roof on posts. They also constructed sweat lodges that were smaller versions of the wickiup (Kelly 1964, 1976).

Subsistence

In the past, plant gathering methods employed by the Southern Paiute primarily were the same as those used by other Numic people. Seeds, mostly from grasses, were gathered using a seed beater, parched using a flat parching tray, and stored in a conical container. Berries, including buffalo berries, choke cherries, currants, elder berries, gooseberries, raspberries, service berries, squaw berries, and strawberries, either were eaten fresh or dried and stored in a buckskin bag. Roots, like the sego root, were collected with a digging stick. Other plants utilized for food by the Southern Paiute include pine nuts, mesquite, some cacti, yucca fruit, cattail, tule, and mescal (Kelly 1964, 1976; Kelly and Fowler 1986; Stoffle et al. 2011). According to Stoffle et al. (2011), plants also played a large role in many different types of ceremonial and non-ceremonial activities. Plants were used traditionally for ceremonial, medicine, food, and utilitarian functions.

As stated previously, the Southern Paiute were hunters and gatherers; however, a few of the bands did practice a small amount of horticulture (Lockwood 1872; Lyle 1872; Steward 1938). The Las Vegas band and Chemehuevi adopted the Mojave practice of floodplain farming, as well as the cultivation of associated crops (Kelly and Fowler 1986). Plants grown by the Southern Paiute included corn, squash, pumpkins, musk melons, watermelons, gourds, beans, sunflower, winter wheat, and devil's claw (Kelly and Fowler 1986). Southern Paiutes were active plant managers of both domesticated and non-domesticated plants (Stoffle et al. 2011).

Around the time of European contact, hunting methods used by the Southern Paiute were similar to those of other Numic people, but were adapted to meet environmental conditions. They held organized drives to capture and kill rabbits and antelope. Antelope drives did not appear to be shamanistic and were not held often (Kelly 1976). Mountain sheep sometimes were hunted by parties who ran the sheep into a cleft in a canyon or onto a promontory. The hunters used fire to drive the sheep. Occasionally they would run the mountain sheep off a bluff. Other animals hunted for food included deer, bears, mountain lions, young coyotes, foxes, wildcats, porcupines, beavers, marmots, badgers, ground hogs, rock squirrels, prairie dogs, squirrels, chipmunks, wood rats, mice, gophers, ducks, flickers, mourning doves, sage hens, wild turkeys, quail, owls, eagles, bird eggs, fish, lizards, snakes, locusts, ant larvae, and caterpillars (Kelly 1976; Kelly and Fowler 1986).

Religion and Ceremonies

The Southern Paiute practiced a form of spirituality known by anthropologists as shamanism. As with other cultures, Southern Paiute shamans received their power through dreams. During these dreams, the prospective shaman was visited by one or more tutelaries, usually in animal form. The tutelaries bestowed the shaman with power and provided instructions and songs (Kelly and Fowler 1986). For the Chemehuevi and Las Vegas band, dreams sometimes could be obtained by spending a night alone in one of several caves (Laird 1976).

The Southern Paiute utilized relatively few ceremonies and dances. These included the Mourning Ceremony or Cry, Ghost Dance of the 1890s, Round Dance, and a dance involving the Deer or Mountain Sheep Song (Kelly and Fowler 1986). The Ghost Dance was a culturally significant event that, when manifested in a particular place and space, reaffirmed the identity of a people (Stoffle et al. 2011). Other dances not considered originally Southern Paiute were part of ceremonial life by the early 20th Century, including a non-circle dance and a Prophesy song prevalent among the Moapa, Panaca, and Pahranagat that was adopted from the Western Shoshone (Kelly and Fowler 1986).

Oral Traditions

To the Southern Paiute, in the beginning of the world, it was covered with water. Two men, Coyote and his older brother, Panther, built a house in a dry place in southern Nevada. Coyote was an integral part of Southern Paiute oral history. He was responsible for naming animals at the beginning of time, stealing fire for mankind, starting agriculture, establishing birth customs, and teaching the people how to tie a bowstring and make pottery.

Government-to-Government Consultation

The BLM initiated government-to-government consultation for the SNWA GWD Project EIS on February 23, 2007, by sending letters to all federally recognized Indian tribes either located in or with traditional ties to the analysis area (**Table 3.17-1**). Letters were sent to inform the various groups of the proposed undertaking and to solicit their concerns regarding the possible presence of properties of cultural, religious, and/or traditional importance to the tribes in the analysis area. In addition, the BLM sent letters to the Western Shoshone Defense Project, Inter-Tribal Council of Nevada, and Western Shoshone National Council to inform them of the proposed GWD Project. As part of the government-to-government consultation, the BLM project manager, as the delegated official, participated in over 30 tribal council meetings. In addition, BLM provided, at tribal request, a workshop on NEPA, DOI policies and groundwater science as well as 10 other inter-tribal meetings where tribal council members and tribal community participants could provide input, express concerns, and request clarification on the project and NEPA process. In May 2012, the State Director, as the decision-maker, consulted with 16 tribes, in an intertribal meeting. **Table F3.17-1** in **Appendix F** lists the contacted Native American groups and summarizes the consultation, communication, and coordination efforts. A complete record of the government-to-government consultation for tier 1 of this project has been compiled into a Consultation Report, which is contained within the administrative record for this project. This report contains sensitive information specific to particular Indian tribes and is, therefore, unavailable for public review.

Through the consultation process, BLM has become aware and has documented many tribal concerns, some of which are highly focused geographically while others are very large and landscape-level in nature:

- Tribes' concerns for possible changes to the physical environment resulting from implementation of the project (including movement of water) as described in the EIS. Tribes' concerns that implementation of the project may eventually be associated with adverse or negative effects to both individual sites of tribal concern and to the larger landscape/environment, which is also a tribal concern, including changes to or loss of vegetation or animal species, for example.
- Tribes have asserted a connection between the condition of both individual sites of tribal concern and the land with the cultural and spiritual well-being of some tribal members, or even assertions that an entire tribe's well-being can be jeopardized by such changes.
- Some tribal persons have asserted the aspects of tribal identity, and perhaps tribal survival, are tied to stability of the current condition of the land and its health.
- Tribal assertions that a decline in the condition of the land that is attributable to removal of water by the project could result in a decline in tribal members' sense of themselves as being Indian or as being a member of a specific tribe.

- Tribes assert that some changes from groundwater withdrawals could affect the location and density or even existence of some plant or animal species that tribes utilize in their subsistence or in activities that maintain and sustain cultural identity in its transmission from one generation to another. Tribes have identified that changes in the location and density of such resources could affect tribal access for obtaining these resources as the resources become more remote or in how the resources are procured or processed if they become less abundant.
- The BLM has also been informed by some tribes that not all resources or areas of concern have been made known to the BLM. The BLM has made commitments in documents such as the Programmatic Agreement (**Appendix F3.16**), which will complete the required identification and determination of steps to be taken to avoid, minimize, or mitigate to the extent practicable, in accordance with law and regulation.

As part of the consultation process, the BLM asked the tribes to identify culturally significant plants and animals. Three of the tribes provided lists of culturally significant plant and animal species; impacts to these species are analyzed in Sections 3.5, Vegetation Resources; 3.6, Terrestrial Wildlife; and 3.7 Aquatic Biological Resources. **Table 3.5-8** in Section 3.5, Vegetation Resources, lists specific plant species that some of the tribes have identified as culturally significant (Steele 2010a; Ely Shoshone 2010; Martineau 2010). Tribal correspondence concerning culturally significant plants is contained in **Appendix F3.5**. Some of the animals identified by the tribes as culturally significant include elk, bighorn sheep, deer, bears, mountain lions, rock chucks, pocket gophers, rabbits, sage-grouse, and various species of raptors and waterfowl (see Section 3.6, Terrestrial Wildlife, for a complete list).

Table 3.17-1 List of Contacted Native American Tribes

Chemehuevi Indian Tribe	Paiute Indian Tribe of Utah: Cedar Band of Paiute Indians Indian Peaks Band of Paiute Indians Kanosh Band of Paiute Indians Koosharem Band of Paiute Indians Shivwits Band of Paiute Indians
Colorado River Indian Tribes	
Confederated Tribes of the Goshute Reservation	
Duckwater Shoshone Tribe	
Duck Valley Shoshone-Paiute Tribes	
Ely Shoshone Tribe	
Fort Mojave Indian Tribe	Te-Moak Tribe: Battle Mountain Band Elko Band South Fork Band Wells Band
Hualapai Tribe	
Kaibab Paiute Tribe	
Las Vegas Paiute Tribe	
Moapa Band of Paiutes	
Pahrump Paiute Tribe (non-federally recognized)	Timbisha Shoshone Tribe
	Yomba Shoshone Tribe

Prior to initiation of government-to-government consultation, several tribes communicated with the BLM regarding Native American concerns. For example, the Confederated Tribes of the Goshute Reservation submitted a resolution (Resolution No. 06-G-39) to the BLM dated July 26, 2006 (Steele 2006). The resolution lists the following tribal concerns regarding the proposed GWD Project:

- Irreparable harm to the flow and output of artesian springs and streams;
- Negative impact on wildlife and agriculture;
- Cultural, religious, and environmental implications; and
- Sacredness of the water.

The Confederated Tribes of the Goshute Reservation expressed opposition to the proposed GWD Project in "order to protect the springs and streams, which have cultural and spiritual significance to Goshute." According to the Goshute Tribe, "for centuries the land and water on the aboriginal lands of the Goshute have been central to tribal culture and religion, and tribal members have lived in harmony with plants and animals in a delicate natural and spiritual balance.

The Goshutes know that the earth is alive and that water is the earth's lifeblood and life comes from and returns to water. Water is the first living spirit on earth and the lifeline of everybody in the world; without water, life on earth would cease. Water is physically precious and spiritually significant to the native peoples in the Great Basin. Tribal governments have been preserving the quality of their land, air, and water to provide for their people's welfare and economic health. When the water is gone, the future is gone" (Steele 2006).

In June 2008, the National Congress of American Indians (NCAI) Resolution REN-08-017, "Opposing the Southern Nevada Water Authority Water Pumping Proposal," was adopted by the NCAI General Assembly (Allen 2008). The NCAI was established in 1944 and is the oldest and largest national organization of American Indian and Alaska Native tribal governments. The resolution states that "SNWA's pending applications and groundwater development proposal would drain Spring and Snake valleys of all supposedly available groundwater in those valleys," and that "disrupting the hydrological and ecological system of our aboriginal lands, including Spring and Snake valleys, will cause wide ranging groundwater problems and result in profound harmful and long-lasting environmental, economic, cultural, and spiritual impacts on the people of the Great Basin." Concluding statements in the resolution make clear that the "NCAI opposes the groundwater application of the Southern Nevada Water Authority in Spring Valley, Snake Valley, other areas within and surrounding the aboriginal lands, and the Great Basin" (Allen 2008).

In April 2010, the Confederated Tribes of the Goshute Reservation submitted another resolution (Resolution No. 10-G-24) to the BLM in which the tribe expresses "continued opposition to the proposed SNWA GWD Project" (Steele 2010a). The tribe believes that SNWA's proposed groundwater pumping would:

- Deplete groundwater supplies of the Great Basin Tribes aboriginal lands;
- Alter the quality of groundwater in the entire flow system;
- Alter the flow of groundwater in the entire groundwater flow system;
- Alter the amount and quality of water available to down-gradient users;
- Reduce water output in seeps, springs, wells, streams, and other surface water features linked to groundwater;
- Irreversibly harm the ecosystem and the plants, animals, and people that require those area for persistence;
- Affect the distribution of plants and animals that are of cultural significance to the Great Basin Tribes;
- Degrade and eliminate cultural and spiritual resource sites; and
- Degrade and eliminate water resources that sustain our people and their future economic development opportunities.

The Confederated Tribes of the Goshute Reservation requested the NCAI and other affected Indian Tribes to adopt their resolution and similar resolutions opposing the SNWA GWD Project.

In June 2011, the Utah Tribal Leaders Association submitted *Joint Inter-Tribal Resolution No. UTL JUN-05-11* to the BLM (Holly 2011). The resolution details the Tribal Leaders opposition to the "groundwater applications of the Southern Nevada Water Authority in Spring Valley, Snake Valley, and other areas within and surrounding the aboriginal lands and Great Basin." As stated in the resolution, "the land and water comprising the aboriginal Indian lands in the Great Basin region have been central to the culture and religion of the Great Basin Tribes" who "have purposefully lived in harmony with the water, plants, and animals in a delicate natural and spiritual balance. The aboriginal lands contain many cultural sites and natural features, especially wetland areas which include, but are not limited to springs, seeps, marshes, wet meadows, streams, rivers, riparian areas, and all permanent and ephemeral water resources of great spiritual and cultural importance of the Great Basin Tribes." In the resolution, the Tribal Leaders list the same concerns as the Confederated Tribes of the Goshute Reservation in their April 2010 Resolution No. 10-G-24 (see bulleted list directly above). The Tribal Leaders request that "the Nevada State Engineer respect the Confederated Tribes of the Goshute's right to continued physical, economic, cultural, and spiritual survival, and recognize that SNWA's groundwater export applications and proposal would drain the aboriginal land of the water necessary for their survival."

On April 24, 2012, the BLM received *Joint Inter-Tribal Resolution No. UTL MAR-07-12* from the Utah Tribal Leaders Association (Naranjo 2012). In the resolution, the Utah Tribal Leaders express concerns with the pumping effects of the proposed GWD Project on a traditionally, spiritually, and culturally significant site located within Spring Valley. According to the Tribal Leaders, the site is "an area of ongoing active ceremonial use and spiritual practice by the Goshute and Western Shoshone people," and is an "ecologically unique environment" in which pumping and exporting groundwater from Spring Valley would "cause severe and irreparable harm to" the tribes' "culture, traditions, and religious practices." The Tribal Leaders are in the process of identifying and delineating the site as an Indian Sacred Site under Executive Order 13007, and nominating the site as a TCP on the NRHP. Per the resolution, the Tribal Leaders request designation of the site as an Indian Sacred Site and TCP prior to approvals being granted for groundwater development in Spring Valley.

In general, Native American groups participating in tribal consultation have expressed concern that pumping groundwater from the hydrologic basins may decrease or eliminate flows of springs within and surrounding the basins. According to some tribal members, all natural springs and sources of groundwater are considered to be culturally important to the Native American people and the culture of the Great Basin area. Additional concerns expressed by the tribal groups include evidence of their ancestors' occupation and use of traditional homelands within the analysis area, burials, archaeological sites, pine nut harvesting, and cultural beliefs about natural resources, such as plants, animals, and water.

Opportunities for the identification of locations of possible cultural and religious importance and traditional practices that may be affected by the proposed GWD Project will remain open throughout the consultation process, which currently is ongoing, and would continue through project construction and subsequent NEPA analyses for future tiers of the proposed GWD Project.

3.17.1.2 Ethnographic Assessment

As a result of consultation and communication with the tribes identified in **Table 3.17-1**, the BLM determined that an ethnographic assessment would be prepared to identify tribal places of religious and cultural significance and traditional practices that may be affected by the proposed GWD Project, and would serve as one of several tools used by the BLM in its reasonable and good faith efforts to identify these places and practices. Other tools include the pending Class III inventory reports, literature searches, archival reviews, conversations with tribal community members, phone calls, tribal council meetings, discussions, inter-tribal meetings, field trips, ethnographic studies of new projects in the same or adjacent areas, and exchanges of information by letter or email.

The ethnographic assessment involved the identification, documentation, and some evaluation of properties of religious and cultural significance to Native Americans, including potential TCPs and sacred sites. This was accomplished through: 1) contacts with tribal governments and individuals to request participation in identifying important cultural, traditional, and religious sites, and to identify individuals knowledgeable of the analysis area; 2) oral history interviews with tribal members who knew of important Native American cultural sites/places within the analysis area to develop an inventory of these sites/places; 3) review of published and unpublished literature relative to Native American occupancy and use of the analysis area; 4) field visits to sites identified as important to Native Americans within the analysis area; and 5) documenting concerns and recommendations regarding potential impacts, and treatment and preservation of the identified sites and places.

Site-specific information regarding traditional, culturally-sensitive or religious places is not completely known. Ongoing government-to-government consultation may supplement current ethnographic knowledge and would serve to refine and clarify the results of the ethnographic assessment.

Ethnographic Assessment Methodology

Ethnographers Stephen Weidlich and Molly Molenaar conducted the ethnographic assessment and prepared the subsequent report. Mr. Weidlich was assigned to engage directly with those tribes either located in, or with traditional ties to, the southern half of the analysis area (**Table 3.17-2**). These tribal groups included all Southern Paiute, Chemehuevi, and Mojave, including the Colorado River Indian Tribes. Ms. Molenaar was assigned to engage directly with those tribes located in, or with traditional ties to, the northern half of the analysis area (**Table 3.17-2**). These tribal groups included Western Shoshone and Goshute. In June 2008, these tribes were invited to participate in the upcoming ethnographic assessment.

To begin the ethnographic assessment, the BLM held informational meetings with interested tribes in Elko on January 23, 2008; in Ely on February 20, 2008; and in Las Vegas on February 26, 2008. Representatives from the Elko Band, South Fork Band, and Wells Band attended the meeting in Elko. Representatives from the Duckwater Shoshone Tribe, Ely Shoshone Tribe, and Confederated Tribes of the Goshute Reservation were in attendance at the Ely meeting. Tribal representatives from the Cedar Band, Chemehuevi Indian Tribe, Colorado River Indian Tribes, Hualapai Tribe, Indian Peaks Band, Kaibab Band of Paiute Indians, Las Vegas Paiute Tribe, Moapa Band of Paiutes, Paiute Indian Tribe of Utah, Shivwits Band of Paiutes, and Timbisha Shoshone Tribe participated in the Las Vegas meeting. At these meetings, SNWA and the BLM introduced various components of the proposed GWD Project, including the ongoing water studies, water rights, and groundwater modeling efforts.

Table 3.17-2 Tribes Contacted for the Ethnographic Assessment by Ethnographer

Stephen Weidlich	Molly Molenaar
Chemehuevi Indian Tribe	Confederated Tribes of the Goshute Reservation
Colorado River Indian Tribes	Duck Valley Shoshone-Paiute Tribes
Fort Mojave Indian Tribe	Duckwater Shoshone Tribe
Hualapai Tribe	Ely Shoshone Tribe
Kaibab Paiute Tribe	Te-Moak Tribe:
Las Vegas Paiute Tribe	Battle Mountain Band
Moapa Band of Paiutes	Elko Band
Pahrump Paiute Tribe	South Fork Band
Paiute Indian Tribe of Utah:	Wells Band
Cedar Band of Paiute Indians	Timbisha Shoshone Tribe
Indian Peaks Band of Paiute Indians	Yomba Shoshone Tribe
Kanosh Band of Paiute Indians	
Koosharem Band of Paiute Indians	
Shivwits Band of Paiute Indians	

Of the 25 tribes and bands contacted for the ethnographic assessment, 11 tribes and three bands of the Paiute Indian Tribes of Utah requested to participate: Confederated Tribes of the Goshute Reservation, Duckwater Shoshone Tribe, Ely Shoshone Tribe, Timbisha Shoshone Tribe, Colorado River Indian Tribes, Kaibab Paiute Tribe, Las Vegas Paiute Tribe, Moapa Band of Paiutes, Pahrump Paiute Tribe, Chemehuevi Indian Tribe, and the Paiute Tribe of Utah, including the Cedar, Indian Peaks, and Shivwits bands. Of the remaining tribes, the Te-Moak Tribe of Western Shoshone Indians of Nevada and its constituent bands (Battle Mountain, Elko, South Fort, and Wells) declined to participate because they are opposed to the proposed project. The Yomba Shoshone Tribe, Fort Mojave Indian Tribe, and Hualapai Tribe declined participation and most deferred to those tribes with closer ties to the analysis area. The Duck Valley Shoshone-Paiute Tribe and Kanosh Band of Paiutes did not provide a final response to the request for participation in the ethnographic assessment.

Review of archival records and literature sources was conducted by Ms. Molenaar and Mr. Weidlich to obtain background information on previously identified places of tribal importance and to provide a baseline for field investigations. Both general ethnographic literature and previous project reports were included in the review.

The fieldwork component of the ethnographic assessment involved Native American contacts via telephone, email, faxes, and letters; meetings with tribal representatives; interviews; and field visits to the analysis area. Eight field visits were conducted as part of the ethnographic assessment.

- July 8, 2008: representatives of the Ely Shoshone Tribe, Duckwater Shoshone Tribe, and Confederated Tribes of the Goshute Reservation participated in field visits to Snake and Spring valleys.
- July 11, 2008: representatives of the Timbisha Shoshone Tribe, Moapa Band of Paiutes, and Shivwits Band of Paiutes participated in a field visit to the Pahranagat NWR.

- September 4, 2008: representatives of the Ely Shoshone Tribe, Duckwater Shoshone Tribe, and Indian Peaks Band of Paiute Tribe participated in a field visit to Cave Valley.
- October 14, 2008: representatives of the Pahrump Paiute Tribe participated in a field visit to Coyote Spring Valley.
- January 23, 2009: representatives of the Moapa Band of Paiutes, Kaibab Paiute Tribe, and Confederated Tribes of the Goshute Reservation participated in field visits to Coyote Spring, Pahranagat, and Delamar valleys.
- August 8, 2009: representatives of the Confederated Tribes of the Goshute Reservation and Ely Shoshone Tribe participated in a field visit to North Snake Valley.
- August 25, 2009: a representative of the Las Vegas Paiute Tribe participated in field visits to Coyote Spring, Pahranagat, and Delamar valleys.
- January 7, 2010: representatives of the Shivwits Band, Chemehuevi Tribe, and Cedar Band participated in a field visit to Dry Lake Valley.

Tribal Comments on the Ethnographic Assessment

In November 2009, the BLM mailed hard copies of the draft ethnographic assessment report to the tribal groups listed on **Table 3.17-2**. Following receipt of the draft report, the tribal groups were invited to two all-day meetings hosted by the BLM. One of the meetings was held in Ely, Nevada, on December 8, 2009, and the other in Las Vegas, Nevada, on December 9, 2009. The purpose of the meetings was to discuss and comment on the draft report. Tribal representatives from the Cedar Band Paiute, Ely Shoshone, Confederated Tribes of the Goshute Reservation, Battle Mountain Band Council, Duckwater Shoshone Tribe, South Fork Band of the Te-Moak Tribe, and Ely Duckwater Tribe participated in the Ely meeting. Representatives from the Shivwits Band of Paiutes, Cedar Band of Paiutes, Southern Nevada Pahrump Paiute Tribe, Las Vegas Paiute Tribe, Kaibab Band of Paiute Indians, Moapa Band of Paiutes, Koosharem Band of the Paiute Indian Tribe of Utah, and Chemehuevi Indian Tribe participated in the Las Vegas meeting.

Tribal comments on the draft ethnographic assessment report documented during the December meetings were summarized in meeting notes and mailed to the tribes and bands. At the meetings, the tribes requested additional time to comment on the draft report. Subsequent to the meetings, the BLM received numerous additional comments and has addressed the comments through revisions to the draft report and through the ongoing government-to-government consultation efforts. Many of the tribes felt the assessment was inadequate and limited in scope. Some tribes questioned the methodology used to collect the information on sites of importance to the tribes. Others felt that the ethnographic assessment analysis area did not cover a large enough area.

On January 21, 2010, the BLM received a resolution (Resolution No. 10-G-05) from the Confederated Tribes of the Goshute Reservation regarding the draft ethnographic assessment report. The Confederated Tribes of the Goshute Reservation support the information in the report pertaining to sites and places identified through the literature search and field work conducted for the assessment. However, the proposed project will "have an adverse effect and violate laws if the GWD Project alters any characteristics of properties that qualify for listing on the National Register." Furthermore, the Goshute Tribe states "it is in the best interest of the Goshute Tribe and Native American Indian Tribes to call for the BLM to preserve the village sites" (identified in the draft ethnographic assessment), and for the "BLM to take immediate action to preserve and protect these sites in perpetuity" (Steele 2010b).

On February 8, 2010, the Duckwater Shoshone Tribe sent a resolution (Resolution 2010-D-6) regarding the draft ethnographic assessment report to the BLM. The Duckwater Shoshone Tribe "does not support or accept the ethnographic text in its entirety;" however, the tribe supports the information on sites identified in the report that were "historically used by our ancestors for holding ceremonies and have significant cultural and spiritual connections to the sacred areas." The Tribe "rejects the draft ethnographic assessment" and requests the BLM to "amend the draft ethnographic assessment with Duckwater Shoshone Tribe's approval" and incorporate the approved ethnographic assessment into the SNWA GWD Project EIS (Sanchez 2010).

In January 2011, the BLM sent the final ethnographic assessment, in which tribal comments had been addressed, to the tribes listed in **Table 3.17-1**. Due to the sensitive and confidential nature of the information included in the ethnographic assessment, the document will not be available to the public and will not be included in this EIS.

On March 24, 2011, the Duckwater Shoshone Tribe sent another resolution (Resolution 2011-D-11) regarding the final ethnographic assessment report to the BLM. The Duckwater Shoshone Tribe "rejects" the final ethnographic assessment on the "basis that it does not reflect the tribal concerns of the Duckwater Shoshone Tribe" (Sanchez 2011). Additionally, the Tribe "disagrees with the methodology and lack of formal and private interviews," and requests an ethnographic assessment be conducted correctly with a "professional ethnographic team." The Tribe would be willing to participate in choosing the study team.

Assessment of Places of Tribal Significance

As a result of literature searches, tribal interviews, meetings, consultation, and field trips, a total of 76 locations were identified as possible PRCSs to Native Americans. Information on 54 of the sites can be found in existing records and literature. A total of 48 are known to be located within the analysis area; 4 have been identified within the proposed ROW area. Based on the information obtained through ethnographic sources, tribal interviews, consultation, and field trips, the ethnographers recommended eight of the sites as eligible for the NRHP as TCPs. However, two of the tribal groups contacted as part of the ethnographic assessment requested that all "76 locations identified in the assessment be investigated as possible TCPs." The potential TCPs include one or more of the following site features: villages or settlements, naturally-occurring water, plants important to Native Americans, locations of massacres or violence, graves, spiritual and/or ceremonial areas, rock art, trails, and locations of important events. Specific details on the location of these site features are not included in this document because of the confidential nature of the information.

Evaluation of each site as a TCP will be conducted by the BLM in consultation with those tribal groups that attach cultural and religious significance to the site. The first step in the evaluation process requires defining the TCP's geographic boundary, which will be established by the BLM and tribal groups. Following delineation of the geographic boundary, the proposed TCP will be fully documented. Documentation will include the history and archaeology of the site, as well as a written statement as to the cultural significance to the tribal groups. The statement will be written by the BLM and SNWA's cultural contractor with tribal input and review.

The proposed TCP will then be analyzed for eligibility for the NRHP based on the information gathered through tribal interviews, literature searches, consultation, and field visits. Concurrence on those TCPs determined eligible by the BLM will be requested from the Nevada SHPO. When the BLM Ely and Las Vegas RMPs are revised, which occurs approximately every 10 years, the BLM will amend them to reflect the existence of the TCPs. At that time, the BLM will review any ACECs that contain, or are a part of, an eligible TCP.

The BLM will consult with tribal groups regarding any proposed TCPs in which the BLM is unable to determine as eligible for the NRHP. The BLM and tribal groups will decide between two possible courses of action for these properties: 1) the file on the proposed TCP is kept open in the event more information is obtained in the future; or 2) the proposed TCP is dropped from consideration of future management. If a tribe that attaches religious and cultural significance to a property off of tribal land and does not agree with BLM's eligibility determination, the tribe may ask the ACHP to request BLM to obtain a determination of eligibility in accordance with ACHP's section 106 regulations (36 CFR Part 800.4[c][2]).

3.17.2 Environmental Consequences

The following section provides a site-specific environmental impact analysis for construction and operation of the proposed ROWs and facilities requested in the Tier 1 ROWs request.

3.17.2.1 Rights-of-way

Issues

- Potential impacts to places of cultural, traditional, or religious importance to the tribes.
- Potential impacts to buried sites, in particular, Native American remains and funerary objects.

Assumptions

- Government-to-government consultation currently is underway and would continue through project implementation.
- For those cultural resources that do not meet the criteria of NRHP eligibility, the BLM, in consultation with interested tribes, would determine the appropriate means to avoid, minimize, or mitigate impacts on a case-by-case basis. Consultation also would occur regarding access to these sites.
- Protection of any historic properties and other cultural resources, including properties of religious and cultural significance identified by the tribes would be in accordance with the GWD Project PA, in which the tribes have been invited to participate as concurring parties, as well as with federal regulations.

Methodology for Analysis

Surface disturbance impacts were evaluated for each alternative using the following methods:

- The project-specific issues for the effects analysis were identified based on the information provided by the tribes during Native American consultation, communication, and coordination, and during preparation of the ethnographic assessment (BLM 2010).
- The analysis of potential impacts to Native American traditional values was prepared in accordance with NEPA. For purposes of this analysis, the effects of federal undertakings on properties of cultural and religious importance to contemporary Native Americans are given consideration under the provisions of EO 13007, AIRFA, and recent amendments to the NHPA. As amended, the NHPA now integrates Indian tribes into the section 106 compliance process, and also strives to make the NHPA and NEPA procedurally compatible. Furthermore, under NAGPRA, culturally-affiliated Indian tribes and the BLM jointly may develop procedures to be taken when Native American human remains are discovered on federal lands.
- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, PA, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect Native American resources from ROW construction and operation activities.

3.17.2.2 Proposed Action, Alternatives A through C

Construction and Facility Maintenance

All Right-of-way Construction and Facility Maintenance Impact Issues

The NEPA process does not require a separate analysis of impacts to religion, spirituality, or sacredness. As a result, references in the analysis to such beliefs or practices convey only the terminology used by participants involved in the ethnographic assessment and tribal consultation and coordination conducted for the proposed Project. This terminology does not reflect any BLM evaluation, conclusion, or determination that something is or is not religious, sacred, or

spiritual in nature, but conveys only the information that has been gathered through tribal consultation and coordination and the ethnographic assessment.

Of concern to tribal members were potential impacts to burials, ancestral places associated with religious or spiritual beliefs, archaeological sites (related to their heritage), and culturally significant plants as a result of constructing the proposed pipeline and transmission lines. Some tribal members stated that archaeological sites (including human remains) would be "irrevocably destroyed by project construction," and "large sites located along the proposed GWD Project alignment may have associated human remains." The types of impacts that could occur to these sites, including human remains are discussed in Section 3.16, Cultural Resources, and will not be repeated here.

A total of 76 locations were identified as possible PRCSs through tribal interviews, meetings, consultation, and field trips; 48 of the 76 locations are known to be located within the analysis area. The ethnographers involved in the ethnographic assessment recommended eight of the sites as eligible for the NRHP as possible TCPs. Two of the tribal groups involved in the consultation efforts requested the BLM investigate all 76 locations as possible TCPs. Maps of the 48 known locations show that two known locations would be crossed by the proposed pipeline ROW and two known locations could be visually affected by the proposed transmission lines. The remaining known locations are outside of proposed disturbance areas or not within view of the proposed transmission lines. However, Class III cultural resources inventories of proposed disturbance areas have not been conducted as of this date but would be completed prior to construction in accordance with the PA. Additional PRCSs may be identified during the inventories and the ongoing government-to-government consultation. The cultural resources files search conducted for the proposed GWD Project identified a number of previously recorded prehistoric sites within the proposed pipeline/transmission line ROWs. The sites primarily consist of lithic scatters, artifact scatters, and rock shelters.

The Confederated Tribes of the Goshute Reservation, Paiute Indian Tribe of Utah, and Ely Shoshone submitted lists of plants to the BLM that are culturally significant to members of these tribes. These plants have traditional values for food, medicine, and tools. The lists were combined to identify important plants to all three Tribes, as well as plants unique to each Tribe (see **Table 3.5-8** in Section 3.5 Vegetation Resources).

Resolution of Right-of-way Construction and Facility Maintenance Impacts

A PA among the BLM Ely and Southern Nevada district offices, Nevada SHPO, ACHP, USACE, and SNWA has been developed for an area that encompasses the proposed GWD Project (see **Appendix F3-16** for a copy of the final PA). The PA outlines the steps to be taken to: 1) identify cultural resources; 2) evaluate them to determine if they are eligible for listing on the NRHP; 3) identify potential adverse effects; 4) develop measures to avoid, reduce, or eliminate adverse effects to historic properties; and 5) address inadvertent discoveries. NRHP-eligible resources to be considered under the PA also include PRCSs. In developing the PA, the BLM consulted with all federally recognized Indian tribes with traditional ties to the analysis area, and because of those ties, may attach religious and cultural significance to historic properties that may be affected by the proposed GWD Project. The reader is referred to the PA in **Appendix F3-16** for the list of consulted tribes. Those same tribes were invited to comment on and suggest changes to any part of the agreement prior to it being finalized. Additionally, the BLM invited each of the tribes to be a concurring party to the PA. The tribes have declined to concur in the PA and some of them have identified their reasons in letters, which also are included in **Appendix F3.16**.

In consultation with the Nevada SHPO, ACHP, and interested Indian tribes (regardless of whether or not particular tribes have signed the PA as a concurring party), the BLM would determine whether construction and facility maintenance of the proposed GWD Project would have an adverse effect on any PRCSs. If the BLM determines that a property would be adversely affected, measures to avoid, minimize, or mitigate such effects would be proposed in accordance with the PA. Measures to avoid, minimize, or mitigate effects may include, but would not be limited to, one or more of the following: 1) avoidance through changes in the construction or operational design; 2) data recovery, which might include the systematic professional excavation of a property; 3) the use of landscaping or other techniques that would minimize or eliminate visual effects on a site's setting; 4) a safety buffer or protective fencing between project disturbance and sites; 5) monitoring; or 6) other mitigation determined by the BLM through consultation with the SHPO, ACHP, interested Indian tribes, and other interested parties. Mitigation measures would be based on the types of impacts relevant to the site type.

Individuals and portions of culturally significant plant species populations used for tribal traditional uses (**Table 3.5-8** in Section 3.5, Vegetation Resources) may be removed during ROW clearing and grading. The majority of these species grow in uplands, commonly in association with sagebrush, greasewood, and mixed desert shrublands which occupy the largest surface areas among the regional vegetation cover types. Most of the identified traditional uses plants are distributed widely in the Great Basin and Mojave Desert regions.

Any discovered Native American human remains, funerary objects, or items of cultural patrimony found on federal land would be handled in accordance with the NAGPRA and its implementing regulations (43 CFR Part 10), or any applicable Plan of Action developed and executed for the proposed GWD Project. Any discovered Native American human remains, funerary objects, or items of cultural patrimony found on state or private land would be handled according to the provisions of NRS Chapter 383 (Historic Preservation and Archaeology). All other instances of discovered human remains not addressed by federal or state laws would be managed as determined by the BLM, in consultation with the SHPO, ensuring treatment with respect due such human remains and related materials.

Conclusion: Approximately 12,300 acres would be disturbed as a result of construction activities. Direct impacts to PRCSs, including potential TCPs and sacred sites, could increase in relation to the amount of ground disturbance associated with project construction. A total of 48 locations of tribal importance are known to be located in the analysis area. Of these, two would be crossed by the proposed pipeline ROW and two could be visually affected by the proposed transmission lines. Class III inventories of proposed disturbance areas may identify additional places of tribal importance. Consultation between the BLM and interested tribes would continue in an effort to identify sites of tribal importance, as well as address concerns the tribes may have regarding these resources. No surface disturbance would occur within or immediately adjacent to the boundary of a PRCS, including potential TCPs and sacred sites, prior to completion of all consultation required by law, and, as appropriate, implementation of at least the field phase of any data recovery or mitigation plan to address impacts to that resource. Any data recovery or mitigation plan would be reviewed and approved by the BLM and Nevada SHPO prior to implementation. Interested tribes would be invited to participate as a concurring party in the development of any data recovery or mitigation plan.

Most of the identified culturally significant plant species are distributed widely in the Great Basin and Mojave Desert regions. Abundance of tribal traditional use plants vary from place to place and none are locally endemic or restricted to a single small area. Project clearing and grading operations are not expected to affect the overall availability or abundance of these plants, unless project surface disturbance is located in a highly localized, traditional plant gathering area. The ethnographic interviews did not reveal any such highly specific plant gathering areas that would be directly affected by proposed project surface disturbance, but this does not preclude that disturbance to traditional plant gathering sites may potentially occur

Proposed mitigation measures:

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

During the ethnographic assessment, several tribal representatives requested that tribal individuals monitor project construction, in particular near sites in which the tribes attach cultural and religious significance. To reduce potential direct impacts to these types of sites, Mitigation Measure ROW-NAM-1 (Tribal Monitoring) would provide for the use of qualified tribal monitors in the area of a site in which an Indian tribe attaches religious and cultural significance during project construction. The BLM, in consultation with interested Indian tribes, would identify sites of tribal importance requiring tribal monitors prior to initiation of project construction. Additionally, the BLM would establish the standards required for monitoring.

ROW-NAM-1: Tribal Monitors. In accordance with the PA, tribal monitors would be appointed to monitor pipeline construction in the area of a site in which an Indian tribe attaches religious and cultural significance. The BLM would identify these sites in consultation with interested Indian tribes. Effectiveness: This measure would be effective by enabling Native Americans to monitor sites that have cultural and religious significance to them. In addition, this measure would provide an opportunity for tribal involvement in project implementation and direct "on the ground" participation in the management of cultural resources. Effects on other resources: None.

Residual impacts include:

How many PRCSs, including potential TCPs and sacred sites, would be adversely affected by the proposed GWD Project is currently unknown. If any PRCSs, including potential TCPs and sacred sites, are identified within proposed disturbance areas or within view of proposed aboveground facilities, impacts would be avoided. If avoidance is not feasible, measures to avoid, minimize, or mitigate effects to these properties would be proposed in compliance with federal mandates and the PA, and in consultation with interested Indian tribes. Since some of the cultural, religious, and traditional values associated with these properties cannot be fully mitigated, residual impacts to these properties most likely would occur.

3.17.2.3 Alternative D

The same ROW construction and facility maintenance issues discussed for the Proposed Action and Alternatives A through C would apply to Alternative D, which would involve 225 miles of pipeline and 208 miles of power lines in Clark and Lincoln counties only.

Conclusion. Approximately 8,800 acres would be disturbed as a result of construction activities. Direct impacts to PRCSs, including potential TCPs and sacred sites, could increase in relation to the amount of ground disturbance associated with project construction. Under this alternative, one of the 48 known locations of tribal importance would be crossed by the proposed pipeline ROW and one could be visually affected by the proposed transmission lines. Class III inventories may identify additional properties of cultural and religious importance, including potential TCPs and sacred sites. Native American consultation to identify properties of tribal importance and potential impacts currently is ongoing between the BLM and tribal representatives. No surface disturbance would occur within or immediately adjacent to the boundary of a property of tribal importance prior to completion of all consultation required by law. Measures to avoid, minimize, or mitigate potential impacts to properties of tribal importance would be developed in accordance with the PA and federal mandates, and in consultation with interested Indian tribes.

Approximately 3,200 fewer acres of vegetation would be disturbed under this alternative compared to Alternatives A through C. Abundance of the identified tribal traditional use plants varies from place to place and none are locally endemic or restricted to a single small area. Project clearing and grading operations are not expected to affect the overall availability or abundance of tribal traditional use plants, unless project surface disturbance is located in a highly localized, traditional plant gathering area. The ethnographic interviews did not reveal any such highly specific plant gathering areas that would be directly affected by proposed project surface disturbance, but this does not preclude that disturbance to traditional plant gathering sites may potentially occur.

Proposed mitigation measures:

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

- The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

ROW-NAM-1 (Tribal Monitors) described for the Proposed Action and Alternatives A through C also would be applied to Alternative D.

Residual impacts would be the same as the Proposed Action and Alternatives A through C.

3.17.2.4 Alternatives E and F

The same ROW construction and operation issues for the Proposed Action and Alternatives A through C would apply to Alternatives E and F, which would involve 263 miles of pipeline and 280 miles of power lines within Spring, Delamar, Dry Lake, and Cave valleys.

Conclusion. Approximately 10,700 acres would be disturbed as a result of construction activities. Direct impacts to PRCSs, including potential TCPs and sacred sites, could increase in relation to the amount of ground disturbance associated with project construction. Under these alternatives, 1 of the 48 known locations of tribal importance would be crossed by the proposed pipeline ROW and 1 could be visually affected by the proposed transmission lines. Class III inventories may identify additional PRCSs, including potential TCPs and sacred sites. Native American consultation to identify properties of tribal importance and potential impacts currently is ongoing between the BLM and tribal representatives. No surface disturbance would occur within or immediately adjacent to the boundary of a property of tribal importance prior to completion of all consultation required by law. Measures to avoid, minimize, or mitigate potential impacts to properties of tribal importance would be developed in accordance with the PA and federal mandates, and in consultation with interested Indian tribes.

Approximately 1,600 fewer acres of vegetation would be disturbed under these alternatives compared to Alternatives A through C; but approximately 1,900 acres more than Alternative D. Abundance of identified tribal traditional use plants varies from place to place, and none are locally endemic or restricted to a single small area. Project clearing and grading operations are not expected to affect the overall availability or abundance of tribal traditional use plants, unless project surface disturbance is located in a highly localized, traditional plant gathering area. The ethnographic interviews did not reveal any such highly specific plant gathering areas that would be directly affected by proposed project surface disturbance, but this does not preclude that disturbance to traditional plant gathering sites may potentially occur.

Proposed mitigation measures:

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

- The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

ROW-NAM-1 (Tribal Monitors) described for the Proposed Action and Alternatives A through C, also would be applied to Alternatives E and F.

Residual impacts would be the same as the Proposed Action and Alternatives A through C.

3.17.2.5 Alignment Options 1 through 4

Impacts for the Alignment Options 1 through 4 are identified in relation to the relevant segment of the Proposed Action (**Table 3.17-3**).

Table 3.17-3 Native American Traditional Values Impact Summary for Alignment Options 1 through 4

Alternative	Analysis
Alignment Option 1 (Humboldt-Toiyabe Power Line Alignment) **Option Description**: Change the locations of a portion of the 230-kV power line from Gonder Substation near Ely to Spring Valley (see Chapter 2, Section 2.6 for a full description). **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Impacts (direct and visual) associated with Alignment Option 1 would be less than the comparable Proposed Action segment because there would be fewer acres of disturbance and the alignment would be shorter in length. None of the 48 known locations of tribal importance are located along Alignment Option 1; none are located within view of the alignment.
Alignment Option 2 (North Lake Valley Pipeline Alignment) **Option Description**: Change the locations of portions of the mainline pipeline and electrical transmission line in North Lake Valley (see Chapter 2, Section 2.6 for a full description). **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Direct impacts associated with Alignment Option 2 would be greater than the comparable Proposed Action segment because there would be more acres of disturbance; visual impacts would be less than the comparable Proposed Action segment because portions of Alignment Option 2 would parallel an existing visual intrusion (Highway 93). None of the 48 known locations of tribal importance are located along Alignment Option 2; none are located within view of the alignment.
Alignment Option 3 (Muleshoe Substation and Power Line Alignment) **Option Description**: Eliminate the Gonder to Spring Valley transmission line, and construct a substation with an interconnection with an interstate, high voltage power line in Muleshole Valley (see Chapter 2, Section 2.6 for a full description). **Applicable To**: Proposed Action and Alternatives A through C, E, and F.	• Impacts (direct and visual) associated with Alignment Option 3 would be less than the comparable Proposed Action segment because there would be fewer acres of disturbance and the 230 kV transmission line from Gonder to Spring Valley would be eliminated. None of the 48 known locations of tribal importance are located along Alignment Option 3; none are located within view of the alignment.
Alignment Option 4 (North Delamar Valley Pipeline and Power Line Alignment) **Option Description**: Change the location of a short section of mainline pipeline in Delamar Valley to follow an existing transmission line (see Chapter 2, Section 2.6 for a full description). **Applicable To**: All alternatives.	• Impacts (direct and visual) associated with Alignment Option 4 would be less than the comparable Proposed Action segment because there would be fewer acres of disturbance and Alignment Option 4 would parallel an existing transmission line. None of the 48 known locations of tribal importance are located along Alignment Option 4; one is located within view of the alignment.

3.17.2.6 No Action

Under the No Action Alternative, the proposed GWD Project would not be constructed. No project-related surface disturbance would occur. As a result, none of the potential impacts to Native American traditional values, including potential burials, as identified for the Proposed Action and Alternatives A through C would occur. Places of tribal importance would continue to be affected by natural events (e.g., fire, erosion) and land use factors (e.g., recreation, energy development). Management direction on public lands will be directed by the Ely and Las Vegas RMPs which include objectives and measures to protect properties of traditional, religious, and cultural importance to Indian tribes.

Additionally, no construction or operational impacts to water resources, which were identified by tribal representatives as a resource of concern, would occur. Surface and groundwater resources would continue to be used and developed in the region in accordance with existing water rights and permitted uses.

3.17.2.7 Comparison of Alternatives

The number of PRCSs located within proposed ROW areas or within the viewshed of proposed ROWs for each alternative is shown in **Table 3.17-4**. As indicated in **Table 3.17-4**, there are more PRCSs located within proposed ROW areas or within the viewshed of proposed ROWs associated with the Proposed Action, Alternatives A through C, compared to the other alternatives. The types of impacts that could occur to these properties would be the same as described for the Proposed Action, Alternatives A through C, and would be the same for each alternative.

Potential impacts to tribal traditional use plants as a result of ROW vegetation clearing would be higher under the Proposed Action, Alternative A through C (approximately 12,300 acres), compared to Alternative D (approximately 8,800 acres) and Alternatives E and F (approximately 10,700 acres). However, most of the identified tribal traditional use plants are distributed widely in the Great Basin and Mojave Desert regions and none are locally endemic or restricted to a single small area. Project clearing and grading operations are not expected to affect the overall availability or abundance of tribal traditional use plants.

Table 3.17-4 Properties of Religious and Cultural Significance Located Within Proposed ROWs and the Viewshed of the Proposed ROWs - Proposed Action and Alternatives A through F

Parameter	Proposed Action, Alternatives A through C	Alternative D	Alternative E	Alternative F
PRCSs	2 (ROW) 2 (Viewshed)	1 (ROW) 1 (Viewshed)	1 (ROW) 1 (Viewshed)	1 (ROW) 1 (Viewshed)

3.17.2.8 Groundwater Development and Groundwater Pumping

The following section provides a programmatic analysis of impacts associated with construction and operation of future groundwater well fields, collector pipelines, and associated facilities.

Issues

Groundwater Development Construction and Facility Maintenance

- The same Native American traditional values issues discussed for ROW construction and facility maintenance would apply to groundwater development areas.

Groundwater Pumping

- Groundwater drawdown associated with pumping could affect the streams, springs, and other water sources that are considered sacred by Native American groups.
- Groundwater drawdown could affect plants, animals, and aquatic resources that are considered culturally significant by Native Americans.

Assumptions

Groundwater Development Construction and Facility Maintenance

- Native American consultation currently is underway and would continue through project construction and subsequent NEPA analyses for future tiers of the proposed GWD Project.
- Protection of any historic properties, including properties of religious and cultural significance identified by the tribes would be in accordance with the PA (**Appendix F3-16**) and federal regulations.

Groundwater Pumping

- The impact analysis of Native American traditional values for groundwater pumping is based on the same assumptions listed above for groundwater development.

Methodology for Analysis

Groundwater Development Construction and Facility Maintenance

- The analysis of potential impacts to Native American traditional values is based on the same methods described for ROW construction and operation.
- SNWA would be required to implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation actions. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. Details of the COM Plan are provided in Section 3.20, Monitoring and Mitigation Summary, along with measures to protect Native American resources from ROW construction and operation activities.
- Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

- Groundwater Pumping

- The analysis of groundwater pumping effects to Native American traditional values is based on information provided by the tribes during Native American consultation, communication, and coordination, and during the preparation of the ethnographic assessment.
- The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following:

BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

3.17.2.9 Proposed Action

Groundwater Development Area

Full development of the GWD Project would require groundwater production wells, collector pipelines, and associated facilities. Ground-disturbance associated with construction of the wells, pipelines, and ancillary facilities could directly affect PRCSs, including potential TCPs and sacred sites. Indirect effects, such as illegal collecting of artifacts, vandalism, and inadvertent damage could occur due to increased public access. Proposed aboveground facilities located within the viewshed of any sites of tribal concern could affect the integrity of the site's setting. Subsurface cultural material, including human remains, may be unearthed during construction activities and result in displacement or loss of the material. The actual locations of specific facilities within the groundwater development areas have not been identified at this stage of the project and will be subject to future site-specific NEPA analysis.

Conclusion. Under the Proposed Action, as much as 5,536 acres of permanent ROW and as much as 2,874 acres of temporary ROW would be required within groundwater development areas. Direct impacts to PRCSs, including potential TCPs and sacred sites, could increase in relation to the amount of ground disturbance associated with permanent and temporary ROWs (i.e., wells, pipelines, ancillary facilities). At this time, the number of properties of tribal importance that could be affected by groundwater development is unknown. Consultation between the BLM and interested tribes would be conducted in an effort to identify sites of tribal importance that may be located in areas of proposed ground disturbance or within the viewshed of a proposed aboveground facility. If a property of tribal importance would be affected by groundwater development, measures to avoid, reduce, or mitigate the effects would be proposed in accordance with the PA and federal mandates, and in consultation with interested Indian tribes.

Proposed mitigation measures:

- The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Additional mitigation measures would be developed based on tribal consultation established in the PA. Any additional mitigation measures developed through the consultation efforts would be included in a treatment plan.

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

Groundwater Pumping

The groundwater pumping scenario for the Proposed Action assumes pumping at the full quantities (176,655 afy) listed on the pending water rights application for the five proposed project pumping basins (Spring, Snake, Delamar, Dry Lake, and Cave valleys). Of concern among tribal representatives is the potential for groundwater development to affect the springs and streams in and adjacent to the five hydrologic basins in which pumping would occur. According to tribal representatives, "all living things depend on water, and without it, life would cease. Therefore, drying up the springs or reduction of flow, due to groundwater pumping, is of great concern to Native Americans who view water sources as being sacred." Tribal representatives felt that negatively affecting the springs would jeopardize the health of the plants and animals that rely on the springs for nourishment Affecting these resources in turn affects the traditional practices of the Great Basin tribes, and would affect the use of these resources by future generations of Native Americans. Concerns were expressed that if the viability of the springs is threatened by the proposed GWD Project, then the project would effectively threaten the viability of everything that relies on them. If this were to happen, then the entire basis for the Native American culture in the Great Basin would be affected.

A total of 76 PRCSs were identified through tribal interviews, tribal meetings, and literature review. Many of these sites were chosen by tribal representatives for field visits. The representatives expressed concerns with groundwater pumping effects to five visited sites because of associated springs. These sites included Turnley Spring, Warm Springs, Maynard Lake, Swamp Cedars, and Spring Creek Spring. Of the five sites, three would be affected by groundwater pumping based on a 10-foot drawdown during the three model time frames: Swamp Cedars at full build out, full build out plus 75 years, and full build out plus 200 years; Turnley Spring and Spring Creek Spring full build out plus 75 years and full build out plus 200 years.

The predicted change in groundwater levels attributable to groundwater development under the Proposed Action at full build out, full build out plus 75 years, and full build out plus 200 years are provided in **Figures 3.3.2-3, 3.3.2-4,** and **3.3.2-5** in Section 3.3, Water Resources. **Figures F3.3.8A-1** through **F3.3.8A-3** in **Appendix F3.3.8** show the estimated potential risks to springs located within the projected drawdown area during the three model time frames. The number of springs within the drawdown area and relative risk of impacts by hydrographic basin are summarized in **Table F3.3.9-1A**. Specific inventoried springs located within the drawdown area at the representative points in time are listed in **Appendix F3.3.10**. Specific inventoried springs located within the drawdown area at representative points in time are listed in **Appendix F3.3.10**. Potential effects to perennial springs and streams are summarized in **Table 3.3.2-6**, in Section 3.3, Water Resources. Comparison of the results of the model simulations and the resource impact evaluation for the three representative time periods indicated that the number of springs and miles of perennial streams that potentially could be affected increases at each successive time period.

The Confederated Tribes of the Goshute Reservation, Paiute Indian Tribe of Utah, and Ely Shoshone submitted a list of plants to the BLM that are culturally significant to members of these tribes. All three lists were combined to identify important plants to all three tribes, as well as plants unique to each tribe. The list is shown in **Table 3.5-8** found in Section 3.5, Vegetation Resources. Plant species known to be dependent, or partially dependent, on surface and groundwater sources are noted on the table.

Traditional use plants that are classified as wetland plants (**Table 3.5-8**, Section 3.5, Vegetation Resources) occur in wetlands and meadows. These plant species that are directly dependent on perennial spring and stream flows would experience the greatest potential change in plant species composition. Groundwater drawdown effects on these species could range from small changes in species composition in areas where groundwater levels are maintained over the long term, to a broad-scale conversion of wetlands and meadows to dry grasslands and shrublands, with a disappearance of wetland species over time. It is likely that tribal traditional use wetland plant species occupying wetlands and sub-irrigated grasslands in Spring, Snake, and Lake valleys would become less abundant and less available to the tribes over time. **Figure 3.5-6** in Section 3.5, Vegetation Resources, illustrates the expansion of the 10-foot drawdown contour in relation to the wetlands, potentially affected springs, and potentially affected perennial stream segments under the Proposed Action. **Table 3.17-5** provides a summary of potential affects to wetland/meadow ET areas, springs, and perennial streams for the three model time frames. Successional changes in spring-dependent wetlands and meadows could reduce the availability of tribal traditional use wetland and riparian plants in Spring, Snake, and Lake valleys.

Table 3.17-5 Summary of Potential Impacts to Wetland/Meadow ET Areas, Springs, and Perennial Streams for the Proposed Action

Impact Indicators by Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Wetland/meadow ET area affeeted by 10 feet or greater drawdown (aeres).	117	5,460	8,048
Total number of springs with moderate to high risk of being affeeted by 10 feet or more drawdown.	8	212	305
Total miles of perennial streams with moderate to high risk of being affeeted by 10 feet or more of drawdown.	6	80	112

Pinon trees have provided a food source for Native Americans for hundreds of years, and many social activities revolve around pinon trees and pine nut harvesting. Effects associated with groundwater drawdown could include reduction in

nuts, berries, and other resources that are objects of harvesting and collection for personal use by Native Americans, as well as other residents of the area.

Wildlife species that have been identified by the tribes (Duckwater, Goshute, and Ely Shoshone) as culturally significant include elk, bighorn sheep, antelope, deer, bears, mountain lions, coyotes, wolves, rabbits (pygmy, jack, and cottontail), rock chucks, ground squirrels, pack rats, pocket gophers, sage-grouse, mudhen, crickets, and various species of raptors and waterfowl. These species have cultural significance in many forms, including food resources, spiritual resources, and resources as traditional values (Steele 2010b). These animals have the potential to occur throughout historical aboriginal territories and throughout the analysis area in appropriate habitat.

A change in groundwater levels potentially would reduce water availability in perennial streams and springs, as well as to associated vegetation communities. The potential loss or reduction in available water as a result of water level change could result in long-term changes in wildlife habitats where water sources are hydraulically connected to pumped areas. Reduction or loss of habitats associated with water sources would impact culturally-significant terrestrial wildlife that are dependent on these sources, resulting in a possible reduction or loss of cover, breeding sites, foraging areas, and changes in both plant and animal community structure. Naturally occurring seeps, springs, and perennial stream reaches provide important wildlife habitat in the region of study.

Groundwater pumping under the Proposed Action would affect terrestrial wildlife resources in eight hydrologic basins (Spring, Snake, Cave, Pahranagat, Steptoe, Hamlin, Lake, and Lower Meadow Valley Wash) during the three model time frames. For all species dependent on groundwater dependent habitats, due to the limited amount of these habitats within the analysis area, it is assumed that species' habitats are currently at carrying capacity. As a result, while individuals displaced due to the reduction in these habitats may be able to move, it is assumed that adjacent habitats are already at their full carrying capacity and would not support additional animals (see Section 3.6, Terrestrial Wildlife, for a discussion of impacts to specific terrestrial wildlife).

Conclusion. Although tribal representatives expressed concerns about pumping effects to selected features, they are equally concerned about groundwater pumping effects to all water sources in and adjacent to the analysis area. If impacts to water resources were to occur as a result of groundwater development, impacts to Native American traditional values also would be expected to occur. Implementation of ACMs, which include mitigation and monitoring plans, would likely minimize adverse effects to water resources at selected locations. The success of mitigation would depend on site-specific conditions and details of the mitigation plan. However, given the regional scale of the predicted drawdown, and the number of identified water sources that could be affected, it may not be feasible to effectively mitigate impacts to all of the potentially affected water sources. Impacts to potentially affected water sources in turn would jeopardize the health of the plants and animals that rely on the springs, and affect the use of these resources by future generations of Native Americans.

The reader is referred to Section 3.3.2.9 for a comprehensive discussion of the ACMs, as well as recommended mitigation and monitoring measures, which would supplement the existing commitments included in the ACMs (see GW-WR-3 through 7 in Section 3.3.2.9).

Proposed monitoring measures:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

The COM Plan would be developed and implemented to monitor and mitigate the effects of groundwater pumping on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, PA, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

As described in Water Resources, Section 3.3, water resources mitigation measure GW-WR-7 would assist in avoiding or minimizing impacts to federal resources and federal water rights. Implementation of this measure would reduce potential effects to hydric soils associated with locations where federal water rights or federal water dependant resources are mitigated. Monitoring of surface water resources and groundwater elevations under monitoring measure GW-WR-3a would be used to determine the effectiveness of the implemented measures.

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

3.17.2.10 Alternative A

Groundwater Development Area

Under Alternative A, the types of impacts that could occur as a result of groundwater development would be the same as described for the Proposed Action. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities.

Conclusion. Under this alternative, as much as 3,171 acres of permanent ROW and as much as 1,643 acres of temporary ROW would be required within groundwater development areas. In general, the amount of ground disturbance corresponds to the potential for direct effects to cultural sites, in particular, buried sites or material unearthed during construction activities. As such, fewer impacts to PRCSs, including potential TCPs and sacred sites, are anticipated due to the decrease in surface disturbance compared to the Proposed Action. Consultation efforts and mitigation of potential impacts would be the same as described for the Proposed Action.

Proposed mitigation measures:

- The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, PA, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Additional mitigation measures would be developed based on tribal consultation established in the PA. Any additional mitigation measures developed through the consultation efforts would be included in a treatment plan.

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

Groundwater Pumping

The groundwater pumping scenario for Alternative A assumes pumping at reduced quantities (114,755 afy) from those listed on the pending water rights application for the five proposed project pumping basins (Spring, Snake, Delamar, Dry Lake, and Cave valleys). Under this alternative, three sites with associated springs that were visited by tribal

representatives would be affected by groundwater pumping based on a 10-foot drawdown: Swamp Cedars and Spring Creek Spring at full build out plus 75 years and full build out plus 200 years; Turnley Spring full build out plus 200 years.

The predicted change in groundwater levels attributable to groundwater development under Alternative A at full build out, full build out plus 75 years, and full build out plus 200 years are provided in **Figures 3.3.2-12, 3.3.2-13,** and **3.3.2-14** in Section 3.3, Water Resources. **Figures F3.3.8A-4** through **F3.3.8A-6** in **Appendix F3.3.8** show the estimated potential risks to springs located within the projected drawdown area during the three model time frames. The number of springs within the drawdown area and relative risk of impacts by hydrographic basin are summarized in **Table F3.3.9-2A** in **Appendix F3.3.9**. Specific inventoried springs located within the drawdown area at the representative points in time are listed in **Table F3.3.10-1A** in **Appendix F3.3.10**. Potential total effects to perennial springs and streams are summarized in **Table 3.3.2-9**, in Section 3.3, Water Resources. For the predicted drawdown area at full build out plus 75 years, there are 29 inventoried springs and 86 "other" springs located within the high and moderate risk areas. By full build out plus 200 years, this increased to 46 inventoried springs and 136 "other" springs located within high and moderate risk areas. These springs occur in Cave, Steptoe, Hamlin, Spring (HA 184), Snake, and Lake valleys.

Figure 3.5-7 in Section 3.5, Vegetation Resources, illustrates the expansion of the 10-foot drawdown contour in relation to wetlands, potentially affected springs, and potentially affected perennial stream segments under Alternative A. **Table 3.17-6** provides a summary of potential affects to wetland/meadow ET areas, springs, and perennial streams for the three model time frames under Alternative A. Successional changes in spring-dependent wetlands and meadows would be the same as the Proposed Action. Effects to pinon trees and pine nut harvesting would be the same as for the Proposed Action.

Table 3.17-6 Summary of Potential Impacts to Wetland/Meadow ET Areas, Springs, and Perennial Streams for Alternative A

Impact Indicators by Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Wetland/meadow ET area affected by 10 feet or greater drawdown (acres).	92	4,624	6,137
Total number of springs with moderate to high risk of being affected by 10 feet or more drawdown.	3	115	182
Total miles of perennial streams with moderate to high risk of being affected by 10 feet or more of drawdown.	1	58	81

Alternative A pumping impacts to big game and other wildlife species of concern to the tribes would be similar to those described in the Proposed Action, but the extent of impacts may be reduced given the reduced pumping volumes. See Section 3.6, Terrestrial Wildlife, for a discussion of impacts to specific terrestrial wildlife under Alternative A.

Conclusion. Tribal concerns regarding groundwater pumping effects to water resources within and adjacent to the analysis area are the same as described for the Proposed Action. Implementation of ACMs including mitigation and monitoring would likely minimize adverse effects to water resources at selected locations; however, the success of mitigation would depend on site-specific conditions and details of the mitigation plan. Impacts to potentially affected water sources in turn would jeopardize the health of the plants and animals that rely on the springs, and affect the use of these resources by future generations of Native Americans.

Proposed monitoring measures:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

The COM Plan would be developed and implemented to monitor and mitigate the effects of groundwater pumping on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, PA, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

3.17.2.11 Alternative B

Groundwater Development Area

Under Alternative B, the types of impacts that could occur as a result of groundwater development would be the same as described for the Proposed Action. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities.

Conclusion. Under this alternative, as much as 3,077 acres of permanent ROW and as much as 1,587 acres of temporary ROW would be required in groundwater development areas. In general, the amount of ground disturbance corresponds to the potential for direct effects to cultural sites, in particular, buried sites or material unearthed during construction activities. As such, fewer impacts to PRCSs, including potential TCPs and sacred sites, are anticipated due to the decrease in surface disturbance compared to the Proposed Action. Consultation efforts and mitigation of potential impacts would be the same as described for the Proposed Action.

Proposed mitigation measures:

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, PA, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Additional mitigation measures would be developed based on tribal consultation established in the PA. Any additional mitigation measures developed through the consultation efforts would be included in a treatment plan.

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

Groundwater Pumping

The groundwater pumping scenario for Alternative B assumes pumping at the full diversion rates (176,655 afy) listed on the pending water rights application for the five proposed project pumping basins (Spring, Snake, Delamar, Dry Lake, and Cave valleys). Under this alternative, three sites with associated springs that were visited by tribal representatives would be affected by groundwater pumping based on a 10-foot drawdown: Swamp Cedars at full build out, full build out plus 75 years, and full build out plus 200 years; Turnley Spring and Spring Creek Spring at full build out plus 75 years and full build out plus 200 years.

The predicted changes in groundwater levels attributable to groundwater development under Alternative B at full build out, full build out plus 75 years, and full build out plus 200 years are provided in **Figures 3.3.2-16, 3.3.2-17,** and **3.3.2-18** in Section 3.3, Water Resources. **Figures F3.3.8A-7** through **F3.3.8A-9** in **Appendix F3.3.8** show the estimated potential risks to springs located within the projected drawdown area during the three model time frames. The number of springs within the drawdown area and relative risk of impacts by hydrographic basin are summarized in **Table F3.3.9-3A** in **Appendix F3.3.9**. Specific inventoried springs located within the drawdown area at the representative points in time are listed in **Table F3.3.10-1A** in **Appendix F3.3.10**. Potential total effects to perennial

springs and streams are summarized in **Table 3.3.2-11**, in Section 3.3, Water Resources. For the predicted drawdown area at full build out plus 75 years, there are 54 inventoried springs and 121 "other" springs located within the high and moderate risk areas. By full build out plus 200 years, this increased to 78 inventoried springs and 210 "other" springs located within high and moderate risk areas. These springs occur in Cave, Steptoe, Hamlin, Spring (HA 184), Snake, and Lake valleys.

Figure 3.5-8 in Section 3.5, Vegetation Resources, illustrates the expansion of the 10-foot drawdown contour in relation to wetlands, potentially affected springs, and potentially affected perennial stream segments under Alternative B. **Table 3.17-7** provides a summary of potential affects to wetland/meadow ET areas, springs, and perennial streams for the three model time frames under Alternative B. Successional changes in spring-dependent wetlands and meadows would be the same as the Proposed Action. Effects to pinon trees and pine nut harvesting would be the same as the Proposed Action.

Table 3.17-7 Summary of Potential Impacts to Wetland/Meadow ET Areas, Springs, and Perennial Streams for Alternative B

Impact Indicators by Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Wetland/meadow ET area affected by 10 feet or greater drawdown (acres).	441	5,794	9,190
Total number of springs with moderate to high risk of being affected by 10 feet or more drawdown.	41	175	288
Total miles of perennial streams with moderate to high risk of being affected by 10 feet or more of drawdown.	3	91	120

Alternative B pumping could result in reductions in groundwater dependent terrestrial wildlife habitat and effect terrestrial species. Pumping impacts to big game and other wildlife species of tribal concern would be similar to those described in the Proposed Action, but the distribution of impacts on the landscape would vary. See Section 3.6, Terrestrial Wildlife, for a discussion of impacts to specific terrestrial wildlife.

Conclusion. Tribal concerns regarding groundwater pumping effects to water resources within and adjacent to the analysis area are the same as described for the Proposed Action. Implementation of ACMs including mitigation and monitoring would likely minimize adverse effects to water resources at selected locations; however, the success of mitigation would depend on site-specific conditions and details of the mitigation plan. For a comprehensive discussion of impacts to water resources and proposed mitigation the reader is referred to Section 3.3, Water Resources. Impacts to potentially affected water sources in turn would jeopardize the health of the plants and animals that rely on the springs, and affect the use of these resources by future generations of Native Americans.

Proposed monitoring measures:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, PA, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action

involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

3.17.2.12 Alternative C

Groundwater Development Area

Under Alternative C, the types of impacts that could occur as a result of groundwater development would be the same as described for the Proposed Action. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities.

Conclusion. Under this alternative, as much as 3,171 acres of permanent ROW and as much as 1,643 acres of temporary ROW would be required in groundwater development areas. In general, the amount of ground disturbance corresponds to the potential for direct effects to cultural sites, in particular, buried sites or material unearthed during construction activities. As such, fewer impacts to PRCSs, including potential TCPs and sacred sites, are anticipated due to the decrease in surface disturbance compared to the Proposed Action. Consultation efforts and mitigation of potential impacts would be the same as described for the Proposed Action.

Proposed mitigation measures:

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, PA, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Additional mitigation measures would be developed based on tribal consultation established in the PA. Any additional mitigation measures developed through the consultation efforts would be included in a treatment plan.

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

Groundwater Pumping

Under Alternative C, the maximum pumping rate would be the same as Alternative A (12,000 to 114,755 afy). Under this alternative, two sites with associated springs that were visited by tribal representatives would be affected by groundwater pumping based on a 10-foot drawdown: Swamp Cedars at full build out plus 75 years and full build out plus 200 years; Spring Creek Spring at full build out plus 200 years.

The predicted changes in groundwater levels attributable to groundwater development under Alternative C at full build out, full build out plus 75 years, and full build out plus 200 years are provided in **Figures 3.3.2-19, 3.3.2-20,** and **3.3.2-21** in Section 3.3, Water Resources. **Figures F3.3.8A-10** through **F3.3.8A-12** in **Appendix F3.3.8** show the estimated potential risks to springs located within the projected drawdown area during the three model time frames. The number of springs within the drawdown area and relative risk of impacts by hydrographic basin are summarized in **Table F3.3.9-4A** in **Appendix F3.3.9**. Specific inventoried springs located within the drawdown area at the representative points in time are listed in **Table F3.3.10-1A** in **Appendix F3.3.10**. Potential total effects to perennial springs and streams are summarized in **Table 3.3.2-14**, in Section 3.3, Water Resources. For the predicted drawdown

area at full build out plus 75 years, there are 19 inventoried springs and 44 "other" springs located within the high and moderate risk areas. By full build out plus 200 years, this increased to 26 inventoried springs and 70 "other" springs located within high and moderate risk areas. These springs occur in Hamlin, Spring (HA 184), and Snake valleys.

Figure 3.5-9 in Section 3.5, Vegetation Resources, illustrates the expansion of the 10-foot drawdown contour in relation to wetlands, potentially affected springs, and potentially affected perennial stream segments under Alternative C. **Table 3.17-8** provides a summary of potential affects to wetland/meadow ET areas, springs, and perennial streams for the three model time frames under Alternative C. Successional changes in spring-dependent wetlands and meadows would be the same as the Proposed Action. Effects to pinon trees and pine nut harvesting would be the same as the Proposed Action.

Table 3.17-8 Summary of Potential Impacts to Wetland/Meadow ET Areas, Springs, and Perennial Streams for Alternative C

Impact Indicators by Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Wetland/meadow ET area affected by 10 feet or greater drawdown (acres).	92	2,287	3,250
Total number of springs with moderate to high risk of being affected by 10 feet or more drawdown.	3	63	96
Total miles of perennial streams with moderate to high risk of being affected by 10 feet or more of drawdown.	1	37	59

Alternative C pumping could result in reductions in groundwater dependent terrestrial wildlife habitat and effect terrestrial species. Pumping impacts to big game and other wildlife species of tribal concern would be similar to those described in the Proposed Action, but the extent of impacts may be reduced given the reduced pumping volumes and intermittent pumping regime. See Section 3.6, Terrestrial Wildlife, for a discussion of impacts to specific terrestrial wildlife for Alternative C.

Conclusion. Tribal concerns regarding groundwater pumping effects to water resources within and adjacent to the analysis area are the same as described for the Proposed Action. Implementation of ACMs including mitigation and monitoring would likely minimize adverse effects to water resources at selected locations; however, the success of mitigation would depend on site-specific conditions and details of the mitigation plan. For a comprehensive discussion of impacts to water resources and proposed mitigation the reader is referred to Section 3.3, Water Resources. Impacts to potentially affected water sources in turn would jeopardize the health of the plants and animals that rely on the springs, and affect the use of these resources by future generations of Native Americans.

Proposed monitoring measures:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more

appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

3.17.2.13 Alternative D

Groundwater Development Area

Under Alternative D, the types of impacts that could occur as a result of groundwater development would be the same as described for the Proposed Action. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities.

Conclusion. Under this alternative, as much as 2,635 acres of permanent ROW and as much as 1,370 acres of temporary ROW would be required in groundwater development areas. In general, the amount of ground disturbance corresponds to the potential for direct effects to cultural sites, in particular, buried sites or material unearthed during construction activities. As such, fewer impacts to PRCSs, including potential TCPs and sacred sites, are anticipated due to a decrease in surface disturbance compared to the Proposed Action. Consultation efforts and mitigation of potential impacts would be the same as described for the Proposed Action.

Proposed mitigation measures:

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Additional mitigation measures would be developed based on tribal consultation established in the PA. Any additional mitigation measures developed through the consultation efforts would be included in a treatment plan.

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

Groundwater Pumping

The groundwater pumping scenario for Alternative D assumes that no pumping would occur in Snake Valley, and pumping in Spring Valley would be restricted to the southern portion of the valley within Lincoln County. The maximum groundwater production rate under this scenario is 78,755 afy for the 4 pumping basins (Spring Delamar, Dry Lake, and Cave valleys) is the same as the maximum pumping rate assumed for these basins under Alternatives A, C, and E. Under this alternative, 1 site with an associated spring that was visited by tribal representatives would be affected by groundwater pumping based on a 10-foot drawdown: Spring Creek Spring full build out plus 200 years.

The predicted changes in groundwater levels attributable to groundwater development under Alternative D at full build out, full build out plus 75 years, and full build out plus 200 years are provided in **Figures 3.3.2-23, 3.3.2-24,** and **3.3.2-25** in Section 3.3, Water Resources. **Figures F3.3.8A-13** through **F3.3.8A-15** in **Appendix F3.3.8** show the estimated potential risks to springs located within the projected drawdown area during the three model time frames. The number of springs within the drawdown area and relative risk of impacts by hydrographic basin are summarized in **Table F3.3.9-5A** in **Appendix F3.3.9**. Specific inventoried springs located within the drawdown area at the representative points in time are listed in **Table F3.3.10-1A** in **Appendix F3.3.10**. Potential total effects to perennial

springs and streams are summarized in **Table 3.3.2-16**, in Section 3.3, Water Resources. For the predicted drawdown area at full build out plus 75 years, there are 13 inventoried springs and 28 "other" springs located within the high and moderate risk areas. By full build out plus 200 years, this increased to 31 inventoried springs and 92 "other" springs located within high and moderate risk areas. These springs occur in Cave, Steptoe, Hamlin, Spring (HA 184), Snake, Lake, Spring (HA 201), and Patterson valleys.

Figure 3.5-10 in Section 3.5, Vegetation Resources, illustrates the expansion of the 10-foot drawdown contour in relation to wetlands, potentially affected springs, and potentially affected perennial stream segments under Alternative D. **Table 3.17-9** provides a summary of potential affects to wetland/meadow ET areas, springs, and perennial streams for the three model time frames under Alternative D. Successional changes in spring-dependent wetlands and meadows would be the same as the Proposed Action. Effects to pinon trees and pine nut harvesting would be the same as the Proposed Action.

Table 3.17-9 Summary of Potential Impacts to Wetland/Meadow ET Areas, Springs, and Perennial Streams for Alternative D

Impact Indicators by Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Wetland/meadow ET area affected by 10 feet or greater drawdown (acres).	0	1,507	4,453
Total number of springs with moderate to high risk of being affected by 10 feet or more drawdown.	1	41	123
Total miles of perennial streams with moderate to high risk of being affected by 10 feet or more of drawdown.	0	4	48

Under Alternative D, no pumping would occur in Snake Valley. Alternative D pumping could result in reductions in groundwater dependent terrestrial wildlife habitat and effect terrestrial species. Pumping impacts to big game and other wildlife species of tribal concern would be similar to those described in the Proposed Action, but the distribution of impacts on the landscape would vary given that pumping facilities would be located south of the White Pine County line. See Section 3.6, Terrestrial Wildlife, for a discussion of impacts to specific terrestrial wildlife under Alternative D.

Conclusion. Tribal concerns regarding groundwater pumping effects to water resources within and adjacent to the analysis area are the same as described for the Proposed Action. Implementation of ACMs including mitigation and monitoring would likely minimize adverse effects to water resources at selected locations; however, the success of mitigation would depend on site-specific conditions and details of the mitigation plan. For a comprehensive discussion of impacts to water resources and proposed mitigation the reader is referred to Section 3.3, Water Resources. Impacts to potentially affected water sources in turn would jeopardize the health of the plants and animals that rely on the springs, and affect the use of these resources by future generations of Native Americans.

Proposed monitoring measures:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow

reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In future, additional information may provide opportunities for monitoring or mitigation.

3.17.2.14 Alternative E

Groundwater Development Area

Under Alternative E, the types of impacts that could occur as a result of groundwater development would be the same as described for the Proposed Action. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities.

Conclusion. Under this alternative, as much as 2,683 acres of permanent ROW and as much as 1,396 acres of temporary ROW would be required in groundwater development areas. In general, the amount of ground disturbance corresponds to the potential for direct effects to cultural sites, in particular, buried sites or material unearthed during construction activities. As such, fewer impacts to PRCSs, including potential TCPs and sacred sites, are anticipated due to a decrease in surface disturbance compared to the Proposed Action. Consultation efforts and mitigation of potential impacts would be the same as described for the Proposed Action.

Proposed mitigation measures:

- The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Additional mitigation measures would be developed based on tribal consultation established in the PA. Any additional mitigation measures developed through the consultation efforts would be included in a treatment plan.

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

Groundwater Pumping

The groundwater pumping scenario for Alternative E assumes that no pumping would occur in Snake Valley. The maximum groundwater production rate under this scenario is 78,755 afy for the 4 pumping basins (Spring, Snake, Delamar, Dry Lake, and Cave valleys) is the same as the maximum pumping rate assumed for these same basins under Alternatives A, C, and D. Under this alternative, 2 sites with associated springs that were visited by tribal representatives would be affected by groundwater pumping based on a 10-foot drawdown: Swamp Cedars at full build out plus 75 years and full build out plus 200 years; Turnley Spring full build out plus 200 years.

The predicted changes in groundwater levels attributable to groundwater development under Alternative E at full build out, full build out plus 75 years, and full build out plus 200 years are provided in **Figures 3.3.2-27, 3.3.2-28,** and **3.3.2-29** in Section 3.3, Water Resources. **Figures F3.3.8A-16** through **F3.3.8A-18** in **Appendix F3.3.8** show the estimated potential risks to springs located within the projected drawdown area during the three model time frames.

The number of springs within the drawdown area and relative risk of impacts by hydrographic basin are summarized in **Table F3.3.9-6A** in **Appendix F3.3.9**. Specific inventoried springs located within the drawdown area at the representative points in time are listed in **Table F3.3.10-1A** in **Appendix F3.3.10**. Potential total effects to perennial springs and streams are summarized in **Table 3.3.2-18**, in Section 3.3, Water Resources. For the predicted drawdown area at full build out plus 75 years, there are 19 inventoried springs and 36 "other" springs located within the high and moderate risk areas. By full build out plus 200 years, this increased to 30 inventoried springs and 174 "other" springs located within high and moderate risk areas. These springs occur in Cave, Steptoe, Hamlin, Spring (HA 184), Snake, and Lake valleys.

Figure 3.5-11 in Section 3.5, Vegetation Resources, illustrates the expansion of the 10-foot drawdown contour in relation to wetlands, potentially affected springs, and potentially affected perennial stream segments under Alternative E. **Table 3.17-10** provides a summary of potential affects to wetland/meadow ET areas, springs, and perennial streams for the three model time frames under Alternative E. Successional changes in spring-dependent wetlands and meadows would be the same as the Proposed Action. Effects to pinon trees and pine nut harvesting would be the same as the Proposed Action.

Table 3.17-10 Summary of Potential Impacts to Wetland/Meadow ET Areas, Springs, and Perennial Streams for Alternative E

Impact Indicators by Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Wetland/meadow ET area affected by 10 feet or greater drawdown (acres).	92	2,548	3,835
Total number of springs with moderate to high risk of being affected by 10 feet or more drawdown.	3	55	104
Total miles of perennial streams with moderate to high risk of being affected by 10 feet or more of drawdown.	1	7	23

Under Alternative E, no pumping would occur in Snake Valley. Alternative E pumping could result in reductions in groundwater dependent terrestrial wildlife habitat and effect terrestrial species. Pumping impacts to big game and other species of tribal concern would be similar to those described in the Proposed Action, but the distribution of impacts on the landscape would vary given that pumping facilities would not be located in Snake Valley. See Section 3.6, Terrestrial Wildlife, for a discussion of impacts to specific terrestrial wildlife for Alternative E.

Conclusion. Tribal concerns regarding groundwater pumping effects to water resources within and adjacent to the analysis area are the same as described for the Proposed Action. Implementation of ACMs including mitigation and monitoring would likely minimize adverse effects to water resources at selected locations; however, the success of mitigation would depend on site-specific conditions and details of the mitigation plan. For a comprehensive discussion of impacts to water resources and proposed mitigation the reader is referred to Section 3.3, Water Resources. Impacts to potentially affected water sources in turn would jeopardize the health of the plants and animals that rely on the springs, and affect the use of these resources by future generations of Native Americans.

Proposed monitoring measures:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

3.17.2.15 Alternative F

Groundwater Development Area

Under Alternative F, the types of impacts that could occur as a result of groundwater development would be the same as described for the Proposed Action. Subsequent NEPA analyses would be required to identify potential impacts of groundwater development facilities.

Conclusion. Under this alternative, as much as 4,359 acres of permanent ROW and as much as 2,270 acres of temporary ROW would be required in groundwater development areas. In general, the amount of ground disturbance corresponds to the potential for direct effects to cultural sites, in particular, buried sites or material unearthed during construction activities. As such, fewer impacts to PRCSs, including potential TCPs and sacred sites, are anticipated due to a decrease in surface disturbance compared to the Proposed Action. Consultation efforts and mitigation of potential impacts would be the same as described for the Proposed Action.

Proposed mitigation measures:

- The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

Additional mitigation measures would be developed based on tribal consultation established in the PA. Any additional mitigation measures developed through the consultation efforts would be included in a treatment plan.

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

Groundwater Pumping

The groundwater pumping scenario for Alternative F assumes that no pumping would occur in Snake Valley. The maximum groundwater production rate under this scenario is 114,129 afy for the 4 pumping basins (Spring, Snake, Delamar, Dry Lake, and Cave valleys). Under this alternative, two sites with associated springs that were visited by tribal representatives would be affected by groundwater pumping based on a 10-foot drawdown: Swamp Cedars at full build out plus 75 years and full build out plus 200 years; Turnley Spring full build out plus 200 years.

The predicted changes in groundwater levels attributable to groundwater development under Alternative F at full build out, full build out plus 75 years, and full build out plus 200 years are provided in **Figures 3.3.2-30, 3.3.2-31,** and **3.3.2-32** in Section 3.3, Water Resources. **Figures F3.3.8A-19** through **F3.3.8A-21** in **Appendix F3.3.8** show the

estimated potential risks to springs located within the projected drawdown area during the three model time frames. The number of springs within the drawdown area and relative risk of impacts by hydrographic basin are summarized in **Table F3.3.9-7A** in **Appendix F3.3.9**. Specific inventoried springs located within the drawdown area at the representative points in time are listed in **Table F3.3.10-1A** in **Appendix F3.3.10**. Potential total effects to perennial springs and streams are summarized in **Table 3.3.2-21**, in Section 3.3, Water Resources. For the predicted drawdown area at full build out plus 75 years, there are 30 inventoried springs and 101 "other" springs located within the high and moderate risk areas. By full build out plus 200 years, this increased to 41 inventoried springs and 162 "other" springs located within high and moderate risk areas. These springs occur in Cave, Steptoe, Hamlin, Spring (HA 184), Snake, and Lake valleys.

Figure 3.5-12 in Section 3.5, Vegetation Resources, illustrates the expansion of the 10-foot drawdown contour in relation to wetlands, potentially affected springs, and potentially affected perennial stream segments under Alternative F. **Table 3.17-11** provides a summary of potential affects to wetland/meadow ET areas, springs, and perennial streams for the three model time frames under Alternative F. Successional changes in spring-dependent wetlands and meadows would be the same as the Proposed Action. Effects to pinon trees and pine nut harvesting would be the same as the Proposed Action.

Table 3.17-11 Summary of Potential Impacts to Wetland/Meadow ET Areas, Springs, and Perennial Streams for Alternative F

Impact Indicators by Model Time Frame	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years
Wetland/meadow ET area affected by 10 feet or greater drawdown (acres).	85	3,096	5,519
Total number of springs with moderate to high risk of being affected by 10 feet or more drawdown.	5	131	203
Total miles of perennial streams with moderate to high risk of being affected by 10 feet or more of drawdown.	1	21	33

Under Alternative F, no pumping would occur in Snake Valley. Alternative F pumping could result in reductions in groundwater dependent terrestrial wildlife habitat and effect terrestrial species. Pumping impacts to big game and other wildlife species of tribal concern would be similar to those described in the Proposed Action, but the distribution of impacts on the landscape would vary given that pumping facilities would not be located in Snake Valley. See Section 3.6, Terrestrial Wildlife, for a discussion of impacts to specific terrestrial wildlife for Alternative E.

Conclusion. Tribal concerns regarding groundwater pumping effects to water resources within and adjacent to the analysis area are the same as described for the Proposed Action. Implementation of ACMs including mitigation and monitoring would likely minimize adverse effects to water resources at selected locations; however, the success of mitigation would depend on site-specific conditions and details of the mitigation plan. For a comprehensive discussion of impacts to water resources and proposed mitigation the reader is referred to Section 3.3, Water Resources. Impacts to potentially affected water sources in turn would jeopardize the health of the plants and animals that rely on the springs, and affect the use of these resources by future generations of Native Americans.

Proposed monitoring measures:

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

Proposed mitigation measures:

The COM Plan would be developed and implemented to monitor and mitigate the effects of surface disturbing activities on Native American resources. The COM Plan would integrate protective measures from the following: BLM RMP Management Actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in this EIS. The COM Plan also would be applied to other impact issues discussed in this section.

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

The BLM acknowledges that certain impacts cannot be fully mitigated to the satisfaction of the tribes. As stated earlier in Section 3.17.2.2, Proposed Action, possible mitigation measures may lessen certain impacts. Using current information, it is unlikely that adverse effects to religious, spiritual, or sacred values could be monitored or mitigated. In the future, additional information may provide opportunities for monitoring or mitigation.

3.17.2.16 No Action

Groundwater Development Area

Under the No Action Alternative, the proposed pipelines, powerlines, ancillary facilities, and well fields would not be developed. No project-related surface disturbance would occur. As a result, none of the potential impacts to Native American traditional values, including potential burials, as identified for groundwater development would occur.

Groundwater Pumping

The No Action would be a continuation of historical and permitted water uses, including the continued development of Lincoln and White Pine counties agricultural water rights. Additionally, the No Action includes pumping SNWA's existing water rights associated with their ranch properties in Spring Valley. Water resources important to Great Basin indigenous people would continue to be affected by continued water usage, but to a lesser degree than would be expected as a result of groundwater pumping.

3.17.2.17 Alternative Comparison

The numbers and types of PRCSs, including potential TCPs and sacred sites, that could be affected by groundwater development is unknown at this time. Ground-disturbing activities associated with construction of future facilities have the potential to affect sites or places of tribal concern. In general, the greater amount of disturbance, the greater potential for impacts, in particular to buried sites. **Table 3.17-12** provides a comparison of disturbance acreages for each alternative.

Tribal representatives expressed concerns with groundwater pumping and the effects of pumping not only on water resources, but on the plants and animals that rely on water for their survival. **Table 3.17-12** lists the pumping scenarios at full quantity for each alternative, as well as the springs identified as culturally significant by the tribes. **Table 3.17-13** summarizes the impacts of groundwater pumping on wetland/meadow ET areas, springs, and perennial streams for each alternative. The pumping scenarios and effects to water resources correlate to habitat loss and eventual effects to wildlife species, many of which were identified as culturally significant by Native Americans. As indicated in **Table 3.17-12** and **Table 3.17-13**, the pumping scenario for Alternative D is less than the Proposed Action and the remaining alternatives. Pumping effects to wetland/meadow ET areas at full build out and full build out plus 75 years are less under Alternative D compared to the other alternatives. Under Alternative D, effects to these areas at full build out plus 200 years is less than the Proposed Action and Alternatives A, B, and F.

Table 3.17-12 Summary of Effects to Resources of Tribal Concern – Proposed Action, Alternatives A through F

Parameter	Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Total Construction Disturbance	3,590-8,410 acres	2,069-4,814 acres	4,664 acres	2,069-4,814 acres	2,513-4,005 acres	1,754-4,079 acres	2,573-6,391 acres
Pumping Scenario at Full Quantities	176,655 afy	114,755 afy	176,655 afy	12,000 to 114,755 afy	78,755 afy	78,755 afy	114,129 afy
Springs Identified by the Tribes	Swamp Cedars, Turnley Spring, and Spring Creek Spring	Swamp Cedars, Turnley Spring, and Spring Creek Spring	Swamp Cedars, Turnley Spring, and Spring Creek Spring	Swamp Cedars and Spring Creek Spring	Spring Creek Spring	Swamp Cedars and Turnley Springs	Swamp Cedars and Turnley Springs

Table 3.17-13 Summary of Effects to Wetland/Meadow ET Areas, Springs, and Perennial Streams – Proposed Action, Alternatives A through F

Parameter	Three Model Periods	Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Wetland/Meadow ET unit area affected by 10 feet or greater drawdown (acres)	FBO	117	92	441	92	0	92	85
	FBO + 75 years	5,460	4,624	5,794	2,287	1,507	2,548	3,096
	FBO + 200 Years	8,048	6,137	9,190	3,250	4,453	3,835	5,519
Total number of springs with moderate to high risk of being affected by 10 feet of greater drawdown	FBO	8	3	41	3	1	3	5
	FBO + 75 years	212	115	175	63	41	55	131
	FBO + 200 Years	305	182	288	96	123	104	203
Total miles of perennial streams with moderate to high risk of being affected by 10 feet of greater drawdown	FBO	6	1	3	1	0	1	1
	FBO + 75 years	80	58	91	37	4	7	21
	FBO + 200 Years	112	81	120	59	48	23	33

FBO = Full Build Out

3.17.3 Cumulative Impacts

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Cultural Resources

Climate change effects were not evaluated for this resource because potential effects to cultural resources as a result of climate change cannot be directly quantified.

3.17.3.1 Issues

Rights-of-way and Groundwater Development Area Construction and Maintenance

- Potential impacts to Native American traditional values may have already occurred from PPAs.
- The proposed ROW and groundwater development construction may result in incremental loss of sites of cultural, traditional, and religious importance to the tribes.
- RFFAs have the potential to cause damage to or loss of PRCSs, including TCPs and sacred sites.
- Potential impacts to buried sites, in particular, Native American remains and funerary objects.

Groundwater Pumping

- Water drawdown associated with pumping could affect the streams, springs, and other water sources that are considered sacred by Native American groups.

3.17.3.2 Assumptions

Rights-of-way and Groundwater Development Area Construction and Maintenance

- Native American consultation currently is underway and would continue through project construction and subsequent NEPA.
- Protection of any PRCSs, including potential TCPs and sacred sites identified by the tribes would be developed through ongoing government-to-government consultation.

Groundwater Pumping

The impact analysis of Native American traditional values for groundwater pumping is based on the same assumptions listed above for rights-of-way and groundwater development area construction and maintenance.

3.17.3.3 Methodology for Analysis

Rights-of-way and Groundwater Development Area Construction and Maintenance

- The project-specific issues for the effects to Native American traditional values were identified based on the information provided by the tribes during Native American consultation, communication, and coordination, and during preparation of the ethnographic assessment.
- The analysis of potential impacts to Native American traditional values was prepared in accordance with NEPA. For purposes of this analysis, the effects of federal undertakings on properties of cultural and religious importance to contemporary Native Americans are given consideration under the provisions of EO 13007, AIRFA, and recent

amendments to the NHPA. As amended, the NHPA now integrates Indian tribes into the section 106 compliance process, and also strives to make the NHPA and NEPA procedurally compatible. Furthermore, under NAGPRA, culturally-affiliated Indian tribes and the BLM jointly may develop procedures to be taken when Native American human remains are discovered on federal lands.

Groundwater Pumping

- The analysis of groundwater pumping effects is based on information provided by the tribes during government-to-government consultation, communication, and coordination, and during preparation of the ethnographic assessment.

3.17.3.4 Proposed Action

Rights-of-way and Groundwater Development Area Construction and Maintenance

The cumulative effects study area for Native American traditional values is the same as the analysis area (**Figure 3.17-1**). PPAs and RFFAs are identified in **Tables 2.9-1** through **2.9-4**, and **Figures 2.9-1** and **2.9-2**. It is unknown as to the number of PRCSs, including TCPs and sacred sites that have been adversely affected by PPAs, and would be adversely affected by RFFAs. As such, the following analysis of cumulative impacts to these types of properties and sites is a qualitative assessment rather than a quantitative assessment.

The following Proposed Action cumulative effects analysis of construction and operation of ROWs and groundwater development areas was taken from Section 3.16, Cultural Resources. Since the term "cultural resources" encompasses PRCSs, TCPs, and sacred sites, the cumulative effects analysis of cultural resources is applicable to Native American traditional values. The following text from Section 3.16, Cultural Resources, applies only to construction and operation of ROWs and groundwater development areas and not to groundwater pumping effects.

PPAs consist primarily of existing roads, energy utility corridors, mining districts, and recent wildfires (**Figure 2.9-1**). Other activities that have affected cultural resources include livestock grazing over nearly all public lands and the development of towns and rural communities (Ely, McGill, Baker, Garrison, Pioche, and Panaca). The primary future actions consist of construction of new utilities (pipelines and electrical transmission lines), roads and turbine pads for wind energy projects, which would be located in Spring and Lake valleys. The total estimated surface disturbance for construction and maintenance of the main pipeline and ancillary facilities, plus the anticipated groundwater development facilities would be up to 20,570 acres, which potentially would overlap with PPAs and RFFAs in the cumulative effects study area.

As directed by law, cultural resources inventories are conducted for any actions (e.g., wind farms, transmission lines) involving public lands, and adverse effects to historic properties avoided or mitigated as appropriate. Avoidance through project redesign is the preferred method of mitigation; however, when avoidance is not feasible, data recovery (archaeological excavation) or other forms of mitigation are implemented prior to ground-disturbing activities.

The types of impacts that have occurred and could occur as a result of the proposed GWD Project and the above-mentioned actions include direct, indirect, and visual impacts. As stated previously in Section 3.16, Cultural Resources, direct impacts are associated with physical disturbance that can directly damage or destroy known and unknown (buried) historic properties and other cultural resources. Indirect impacts occur later in time or are farther removed in distance (e.g., erosion, vandalism and illegal collecting of artifacts as a result of increased access). Visual impacts are associated with visual intrusions such as electrical transmission lines or other above-ground structures.

In order to analyze cumulative impacts, impacts first must be identified for the proposed GWD Project before cumulative impacts with PPAs and RFFAs can occur. As such, the cumulative impact analysis should be linked to impacts associated with the proposed GWD Project. Without an impact, there would be no impacts to "add to" the potential impacts of other PPAs and RFFAs. As identified in Section 3.16, Cultural Resources, impacts to historic properties and other cultural resources as a result of the proposed GWD Project include direct impacts to known and unknown historic properties and other cultural resources during ground-disturbing project activities; indirect impacts, such as soil compaction, off-road vehicle traffic associated with construction or maintenance activities, flooding/erosion (associated with a rupture), inadvertent damage to cultural sites, and illegal artifact collection; and, visual impacts to historic properties where setting is an aspect of integrity.

Impacts associated with construction and operation of the TWE, Zephyr, and ON Line transmission projects and Spring Valley and Wilson Creek wind projects would be similar to those identified for the GWD Project. The effects of these projects combined with the proposed GWD Project would be a long-term cumulative loss of historic properties and other cultural resources. As stated previously, direct impacts to known historic properties would be avoided or, if avoidance is not feasible, mitigated through data recovery or other appropriate means of mitigation. Data recovery recovers a significant amount of data, which are then integrated into the regional archaeological database; however, the site ultimately is destroyed by the project. Over time, this represents a long-term cumulative loss. Indirect effects of these projects also would be similar to the proposed GWD Project. Incremental damage to cultural sites or loss of artifacts through increased access and increased numbers of people in the cumulative effects study area would occur over the life of these projects. Installation of transmission line structures and wind turbines would cumulatively impact historic properties in which setting is an important aspect of integrity. These projects when combined with the proposed GWD Project would cumulatively alter the landscape surrounding these types of properties to the point where the integrity of the setting would no longer contribute to the eligibility of the site. Cumulative visual impacts would occur over the life of the projects.

The GWD Project groundwater development area in northern Spring Valley would overlap with the Spring Valley Wind Project near the intersection of Highway 93 and Highways 6 and 50 west of GBNP. The proposed GWD Project would add access roads, water gathering pipelines, and electrical service to well sites with areas currently proposed for wind turbines. Since the specific locations of the proposed GWD Project wells have not been determined, there would be an opportunity to share the wind energy project's road system to reduce the cumulative surface disturbance area of the two projects.

Cumulative direct and indirect effects associated with the Coyote Springs Development would be similar to those described for the wind and transmission line projects. However, cumulative visual impacts to historic properties in which setting is an important aspect of integrity would be less since the proposed development would not be as visually intrusive as transmission line structures and wind turbines.

In summary, direct cumulative effects would occur as a result of the proposed GWD Project when combined with PPAs and RFFAs located in the cumulative effects study area in which surface disturbance has occurred and would occur. These types of impacts would be minimized or mitigated through data recovery or other appropriate mitigation measures in compliance with historic preservation laws. As a result of data recovery, cumulative benefits would occur as recovered site data are integrated into the regional archaeological database. However, the sites ultimately are destroyed, resulting in long-term cumulative loss. Indirect effects are difficult to mitigate as most of the damage has occurred by the time it is discovered. Indirect effects, such as illegal collecting of artifacts, have occurred and most likely would continue to occur in the cumulative effects study area through increased access and development, and increased human presence, as a result of the proposed GWD Project combined with PPAs and RFFAs. Cumulative visual effects to historic properties where the setting is an important aspect of integrity are expected to occur. The proposed GWD Project combined with PPAs and RFFAs have altered and most likely would continue to alter the landscape surrounding these properties. The incremental loss of integrity would diminish the values that make these properties significant.

Groundwater Pumping Effects

Groundwater development could cumulatively affect the springs and streams that are integral to the tradition and culture of indigenous populations in the Great Basin. According to tribal representatives, "all water is connected underground and therefore pumping in the basins would affect all seeps, springs, and streams in the general area despite the use of hydrologic modeling to determine impacts." The general consensus among tribal representatives is that "while a select number of springs are designated as 'sacred,' all springs provide an important role in nourishing the plants and animals that form the cornerstone of a variety of many traditional practices. Groundwater pumping would further strain the aquifer that already has been affected by prolonged drought and global climate change." Tribal representatives noted odd behavior by animals in the area, which is seen by tribal members as an indication of environmental change. The change in animal behavior is seen as a warning by the natural environment that human activity is damaging the area. Tribal representatives anticipate that groundwater pumping would add to these disturbances and disrupt the delicate balance of nature.

In the past, non-Indian settlement and development have cut off access to water sources or other resources considered sacred or as places of traditional religious and cultural importance by Native Americans. Groundwater pumping could have a cumulative impact by further reducing the presence of sacred sites or properties of traditional religious and cultural importance for use by Native American groups. Tribal representatives expressed concerns with groundwater pumping effects to five visited sites because of associated springs. Of the five sites, three would be cumulatively affected by groundwater pumping based on a 10-foot drawdown: Swamp Cedars, Turnley Spring, and Spring Creek Spring.

The hydrologic analysis area for cumulative impacts from groundwater withdrawal encompasses the 35 hydrographic basin regions defined in **Figure 3.3.1-1** (Section 3.3, Water Resources). Detailed results of the cumulative effects at the three model time frames are provided in tables and figures in **Appendix F3.3**. The cumulative drawdown predicted for the Proposed Action groundwater development pumping scenario at representative time frames is provided in **Appendix F3.3.7**. The number of inventoried springs and miles of perennial streams located within the model-simulated cumulative drawdown area and located within areas determined to have a high or moderate risk of impact are presented in **Figures 3.3.3-6** and **3.3.3-7** in Section 3.3, Water Resources.

Traditional use plants occur in the vegetation types that extend across all the hydrologic basins that have been affected by PPAs and would be affected by the proposed GWD Project. **Figures 3.5-16** and **3.5-17** found in Section 3.5, Vegetation Resources, illustrate the cumulative acres of potential root zone soil moisture stress from drawdown for basin shrubland and wetland/meadow ET areas. These figures include impact parameter information for cumulative with No Action, Proposed Action, and cumulative pumping with the Proposed Action as a way of identifying the incremental effects of the alternative.

The degree of impacts to terrestrial wildlife resources would depend on a number of variables, such as the existing habitat values and level of use, species' sensitivity, and the extent of the anticipated water and habitat reductions and shifts. Given the limited amount of these habitat types within the analysis area, it is assumed that species dependent on these areas currently are at carrying capacity. As a result, any individuals displaced as a result of reduction in amount or quality of these habitats could be lost, concentrating the remaining animals within smaller habitat areas. Species groups likely affected by reduction in groundwater dependent habitats would include: big game, small mammals, upland game birds, waterfowl, nongame birds (e.g., raptors and passerines), bats, reptiles, and invertebrates.

There are 11 valleys that have at least 1 of the 3 groundwater dependent habitats incrementally impacted by the Proposed Action in at least 1 of the 3 model time frames (Section 3.6, Terrestrial Wildlife). **Table F3.6-19, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Proposed Action cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in the 11 valleys.

3.17.3.5 Alternative A

Under Alternative A, cumulative effects to Native American traditional values as a result of ROWs and groundwater development area construction and maintenance would be the same as described for the Proposed Action.

Tribal representatives expressed concerns with groundwater pumping effects to five visited sites because of associated springs. Under this alternative, three would be cumulatively affected by groundwater pumping based on a 10-foot drawdown: Swamp Cedars, Turnley Springs, and Spring Creek Spring.

The hydrologic analysis area for cumulative impacts from groundwater withdrawal encompasses the 35 hydrographic basin regions defined in **Figure 3.3.1-1** (Section 3.3, Water Resources). Detailed results of the cumulative effects at the three model time frames are provided in tables and figures in **Appendix F3.3**. The cumulative drawdown predicted for the Alternative A groundwater development pumping scenario at representative time frames is provided in **Appendix F3.3.7**. The number of inventoried springs and miles of perennial streams located within the model-simulated cumulative drawdown area and located within areas determined to have a high or moderate risk of impact are presented in **Figures 3.3.3-6** and **3.3.3-7** in Section 3.3, Water Resources.

The reader is referred to **Figures 3.5-20** and **3.5-21** in Section 3.5, Vegetation Resources, for an illustration of cumulative effects to basin shrublands and wetlands/meadows at risk from drawdown. While a similar pattern of

potential drawdown effects would occur with Alternative A, one notable difference for this cumulative pumping scenario would be that the magnitude of flow reduction would be smaller compared to the cumulative pumping with the Proposed Action.

There are eight valleys that have at least one of the three groundwater dependent habitats incrementally impacted by Alternative A cumulative in at least one of the three model time frames (Section 3.6, Terrestrial Wildlife). **Table 3.6-20**, **Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative A cumulative drawdown in the three model time frames. **Table F3.6-1**, **Appendix F** provides a list of terrestrial wildlife species that occur in the eight valleys.

3.17.3.6 Alternative B

Under Alternative B, cumulative effects to Native American traditional values as a result of ROWs and groundwater development area construction and maintenance would be the same as described for the Proposed Action.

Under this alternative, three springs associated with sites visited by the tribes would be cumulatively affected by groundwater pumping based on a 10-foot drawdown: Swamp Cedars, Turnley Spring, and Spring Creek Spring. The reader is referred to Section 3.3, Water Resources, for a comprehensive summary of cumulative effects to springs, streams, and other water resources.

The hydrologic analysis area for cumulative impacts from groundwater withdrawal encompasses the 35 hydrographic basin regions defined in **Figure 3.3.1-1** (Section 3.3, Water Resources). Detailed results of the cumulative effects at the three model time frames are provided in tables and figures in **Appendix F3.3**. The cumulative drawdown predicted for the Alternative B groundwater development pumping scenario at representative time frames is provided in **Appendix F3.3.7**. The number of inventoried springs and miles of perennial streams located within the model-simulated cumulative drawdown area and located within areas determined to have a high or moderate risk of impact are presented in **Figures 3.3.3-6** and **3.3.3-7** in Section 3.3, Water Resources.

The reader is referred to **Figures 3.5-24** and **3.5-25** (Section 3.5, Vegetation Resources) for an illustration of cumulative effects to basin shrublands and wetlands/meadows at risk from drawdown. Alternative B would contribute the predominant cumulative drawdown effects to streams and springs in Spring and Snake valleys. Alternative B is predicted to cause larger effects on the wetland/meadow ET areas compared to Alternative A.

There are 12 valleys that have at least 1 of the 3 groundwater dependent habitats incrementally impacted by Alternative B cumulative in at least 1 of the 3 model time frames (Section 3.5, Terrestrial Wildlife). **Table F3.6-21, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative B cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in the 12 valleys.

3.17.3.7 Alternative C

Under Alternative C, cumulative effects to Native American traditional values as a result of ROWs and groundwater development area construction and maintenance would be the same as described for the Proposed Action.

Tribal representatives expressed concerns with groundwater pumping effects to five visited sites because of associated springs. Under this alternative, two would be cumulatively affected by groundwater pumping based on a 10-foot drawdown: Swamp Cedars and Spring Creek Spring.

The hydrologic analysis area for cumulative impacts from groundwater withdrawal encompasses the 35 hydrographic basin regions defined in **Figure 3.3.1-1** (Section 3.3, Water Resources). Detailed results of the cumulative effects at the three model time frames are provided in tables and figures in **Appendix F3.3**. The cumulative drawdown predicted for the Alternative C groundwater development pumping scenario at representative time frames is provided in **Appendix F3.3.7**. The number of inventoried springs and miles of perennial streams located within the model-simulated cumulative drawdown area and located within areas determined to have a high or moderate risk of impact are presented in **Figures 3.3.3-6** and **3.3.3-7** in Section 3.3, Water Resources.

The reader is referred to **Figures 3.5-28** and **3.5-29** in Section 3.5, Vegetation Resources, for an illustration of cumulative effects to basin shrublands and wetlands/meadows at risk from drawdown. Similar to springs and streams, there would be lower levels of potential drawdown effects to ET areas from the cumulative contribution of Alternative C as compared to the Proposed Action, and Alternatives A and B.

There are seven valleys that have at least one of the three groundwater dependent habitats incrementally impacted by Alternative C cumulative in at least one of the three model time frames (Section 3.6, Terrestrial Wildlife). **Table F3.6-22, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative C cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in the seven valleys.

3.17.3.8 Alternative D

Under Alternative D, cumulative effects to Native American traditional values as a result of ROWs and groundwater development area construction and maintenance would be the same as described for the Proposed Action.

Under this alternative, one spring associated with sites visited by the tribes would be cumulatively affected by groundwater pumping based on a 10-foot drawdown: Spring Creek Spring. The reader is referred to Section 3.3, Water Resources, for a comprehensive summary of cumulative effects to springs, streams, and other water resources.

The hydrologic analysis area for cumulative impacts from groundwater withdrawal encompasses the 35 hydrographic basin regions defined in **Figure 3.3.1-1** (Section 3.3, Water Resources). Detailed results of the cumulative effects at the three model time frames are provided in tables and figures in **Appendix F3.3**. The cumulative drawdown predicted for the Alternative D groundwater development pumping scenario at representative time frames is provided in **Appendix F3.3.7**. The number of inventoried springs and miles of perennial streams located within the model-simulated cumulative drawdown area and located within areas determined to have a high or moderate risk of impact are presented in **Figures 3.3.3-6** and **3.3.3-7** in Section 3.3, Water Resources.

The reader is referred to **Figures 3.5-32** and **3.5-33** in Section 3.5, Vegetation Resources, for an illustration of cumulative effects to basin shrublands and wetlands/meadows at risk from drawdown. Alternative D would affect a much smaller ET area acreage compared to the Proposed Action and Alternative B. This difference is attributable to the concentration of Alternative D pumping in southern Spring Valley, which would reduce the predicted effects in the larger ET areas in central and northern Spring Valley.

There are seven valleys that have at least one of the three groundwater dependent habitats incrementally impacted by Alternative D cumulative in at least one of the three model time frames (Section 3.6, Terrestrial Wildlife). **Table F3.6-23, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative D cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in the seven valleys.

3.17.3.9 Alternative E

Under Alternative E, cumulative effects to Native American traditional values as a result of ROWs and groundwater development area construction and maintenance would be the same as described for the Proposed Action.

Tribal representatives expressed concerns with groundwater pumping effects to five visited sites because of associated springs. Under this alternative, three would be cumulatively affected by groundwater pumping based on a 10-foot drawdown: Swamp Cedars, Turnley Spring, and Spring Creek Spring. The reader is referred to Section 3.3, Water Resources, for a comprehensive summary of cumulative effects to springs, streams, and other water resources.

The hydrologic analysis area for cumulative impacts from groundwater withdrawal encompasses the 35 hydrographic basin regions defined in **Figure 3.3.1-1** (Section 3.3, Water Resources). Detailed results of the cumulative effects at the three model time frames are provided in tables and figures in **Appendix F3.3**. The cumulative drawdown predicted for the Alternative E groundwater development pumping scenario at representative time frames is provided in **Appendix F3.3.7**. The number of inventoried springs and miles of perennial streams located within the model-simulated cumulative drawdown area and located within areas determined to have a high or moderate risk of impact are presented in **Figures 3.3.3-6** and **3.3.3-7** in Section 3.3, Water Resources.

The reader is referred to **Figures 3.5-36** and **3.5-37** in Section 3.5, Vegetation Resources, for an illustration of cumulative effects to basin shrublands and wetlands/meadows at risk from drawdown. Alternative E would contribute equivalent effects to ET areas in Spring Valley as Alternative A, because the well development pattern would be the same. No effects on ET areas are predicted in Snake Valley at any time interval.

There are nine valleys that have at least one of the three groundwater dependent habitats incrementally impacted by Alternative E cumulative in at least one of the three model time frames (Section 3.6, Terrestrial Wildlife). **Table F3.6-24, Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative E cumulative drawdown in the three model time frames. **Table F3.6-1, Appendix F** provides a list of terrestrial wildlife species that occur in the nine valleys.

3.17.3.10 Alternative F

Under Alternative F, cumulative effects to Native American traditional values as a result of ROWs and groundwater development area construction and maintenance would be the same as described for the Proposed Action.

The hydrologic analysis area for cumulative impacts from groundwater withdrawal encompasses the 35 hydrographic basin regions defined in **Figure 3.3.1-1** (Section 3.3, Water Resources). Detailed results of the cumulative effects at the three model time frames are provided in tables and figures in **Appendix F3.3**. The cumulative drawdown predicted for the Alternative F groundwater development pumping scenario at representative time frames is provided in **Appendix F3.3.7**. The number of inventoried springs and miles of perennial streams located within the model-simulated cumulative drawdown area and located within areas determined to have a high or moderate risk of impact are presented in **Figures 3.3.3-6** and **3.3.3-7** in Section 3.3, Water Resources.

The reader is referred to **Figures 3.5-40** and **3.5-41** in Section 3.5, Vegetation Resources, for an illustration of cumulative effects to basin shrublands and wetlands/meadows at risk from drawdown. Alternative F would contribute equivalent effects to ET areas in Spring Valley as Alternative A, because well development patterns would be the same.

There are twelve valleys that have at least one of the three groundwater dependent habitats incrementally impacted by Alternative F cumulative in at least one of the three model time frames (Section 3.6, Terrestrial Wildlife). **Table F3.6-25**, **Appendix F** provides a summary of basins that have groundwater dependent habitats that are in areas potentially impacted by Alternative F cumulative drawdown in the three model time frames. **Table F3.6-1**, **Appendix F** provides a list of terrestrial wildlife species that occur in the twelve valleys.

3.18 Socioeconomics and Environmental Justice

The study area for socioeconomics and environmental justice is defined in terms of local county boundaries and includes Clark, White Pine, and Lincoln counties in Nevada, and Juab and Millard counties in Utah. These five counties encompass virtually the entire extent of the four basic areal geographies associated with the proposed development and operation of the proposed ROW, groundwater development areas, and most of the area of potential indirect effects from groundwater level declines associated with groundwater pumping (referred to as the region of study) (**Figure 3.18-1**). A number of the hydrographic basins included in the groundwater model extend outside these five counties; small portions of these basins, such as western Beaver County, are at risk for long-term drawdown. However, those areas are excluded from the socioeconomic study area due to their remoteness, sparse population, and limited areal extent of the affected areas, which together limit the potential for appreciable socioeconomic effects.

QUICK REFERENCE

CAGR – Compound Annual Growth Rate

CEQ – Council on Environmental Quality

DRI – Desert Research Institute

EMS – Emergency Medical Services

GID – General Improvement District

LDS – Church of Jesus Christ of Latter Day Saints

LVCVA – Las Vegas Convention and Visitors Authority

MSA – Metropolitan Statistical Area

NDOT – Nevada Department of Transportation

NSD – Nevada State Demographer

NSE – Nevada State Engineer

PILT – Payment in Lieu of Taxes

RV – Recreational Vehicle

UGOPB – Utah Governor's Office of Planning and Budget

UNLV-CBER – University of Nevada, Las Vegas - Center for Business and Economic Research

USACE – U.S. Army Corps of Engineers

USDA – U.S. Department of Agriculture

USE – Utah State Engineer

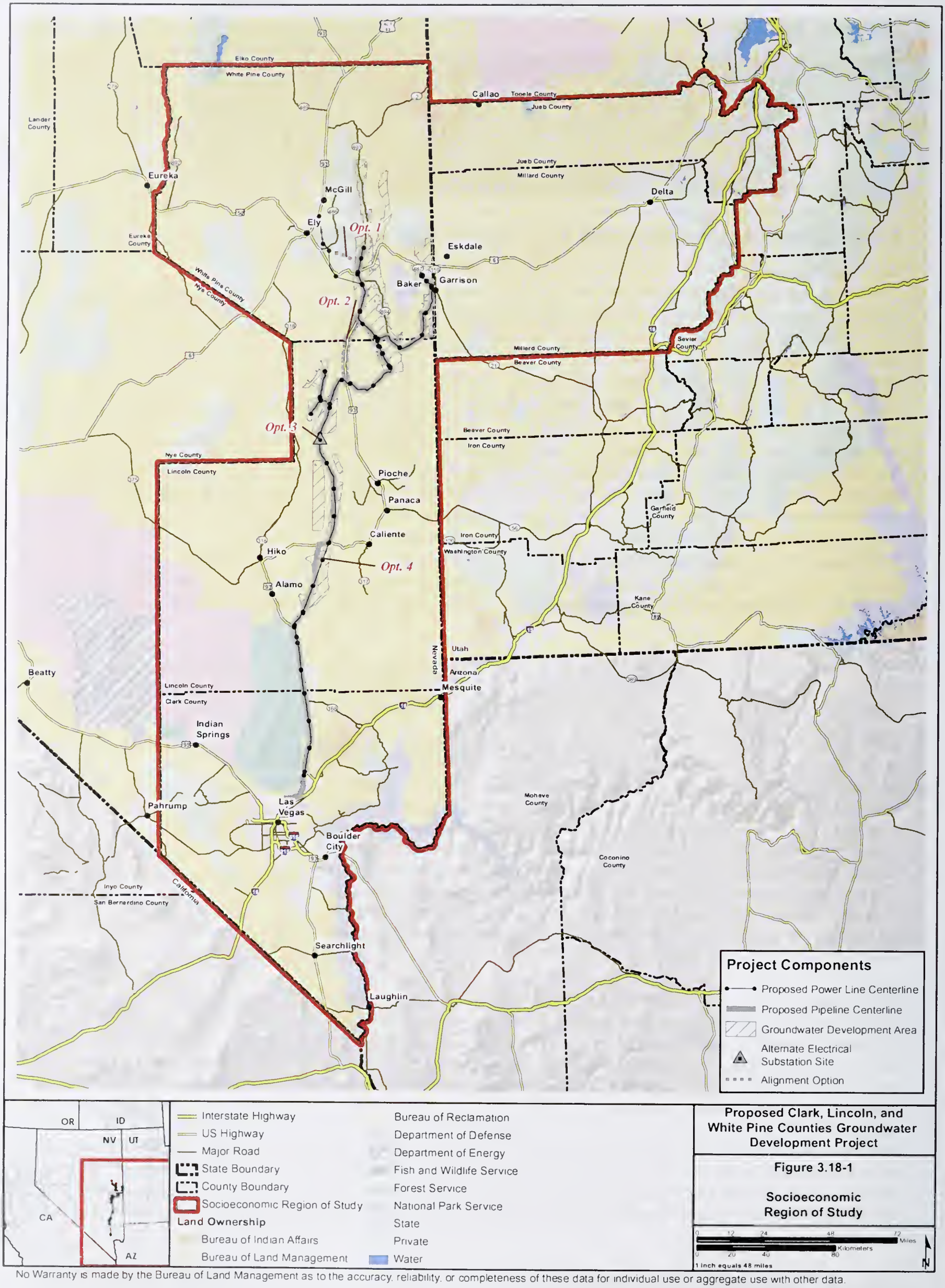
USEPA – U.S. Environmental Protection Agency

3.18.1 Affected Environment

3.18.1.1 Overview

The 3 Nevada and 2 Utah counties encompass a vast geographic expanse of 28,550 square miles, ranging from 555 square miles in Juab County to 10,365 square miles in Lincoln County. Private lands constitute only a small share of the land in the area. As across much of the west, the federal government manages a majority of land in the study area, with the share of such public lands ranging from 70 percent in Juab County to 94 percent in Lincoln County (General Services Administration 2005). Additional lands are managed by the two states and local governments, and lands held in trust for various American Indian tribes are managed by the federal government. Federal and private land ownership patterns in the three Nevada counties are changing as a result of Congressionally authorized major land disposal actions in these counties. These land ownership patterns have numerous implications for social, economic, local governance, and local government finance conditions across the study area.

Clark County and Las Vegas, its major community, is an internationally known entertainment, gaming, and conference/convention/tourism destination. Although hospitality and leisure-related activities support much of the community's economy, its economic base also includes light and heavy manufacturing, financial and other services, and transportation services. The local economies in the rural counties remain heavily dependent on natural resources including agriculture, mineral development, outdoor recreation, and tourism. Clark County was home to 1.95 million residents in 2010 and was among the fastest growing urban areas in the nation, gaining more than 575,000 residents between 2000 and 2010. The area's economy added more than 310,000 jobs between 2000 and 2008; however, the recession resulted in the loss of approximately 100,000 jobs in 2009 and early 2010 (U.S. Bureau of Economic Analysis 2010a, Nevada Department of Employment 2011). The cities of North Las Vegas, Henderson, Boulder City, and Mesquite also are in Clark County and many additional residents live in large urban planned communities in the



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Las Vegas Valley that are not incorporated municipalities. The other 4 counties in the study area are predominately rural, with 2010 resident populations ranging from 5,345 residents in Lincoln County to 12,503 residents in Millard County. The populations of Juab and Millard counties are concentrated in the eastern sections of those counties, more than 80 highway miles from the potentially affected areas. [1]

Communities[2] located in or near the proposed groundwater pumping basins in Lincoln and White Pine counties include Ely, Baker, Pioche, Panaca, Caliente, and Alamo in Nevada, and Garrison and Callao in Utah. Other nearby communities, settlements, and developments in the area include McGill, Ruth, Lund, Hiko, and Ursine (Eagle Valley). Ely is the largest community in the rural area (2010 population of 4,255), and along with Caliente (2010 population of 1,130) are the only incorporated communities in these 2 counties.[1]

No American Indian Reservations are located within the proposed groundwater pumping basins, although five are located wholly or partially within the three Nevada counties: the Ely Shoshone Reservation, the Confederated Tribes of the Goshute Indian Reservation, the Moapa Indian Reservation, the Las Vegas Colony, and the Fort Mojave Reservation (NPS 1997). The Las Vegas Colony and Fort Mojave Reservation are quite distant from the project ROW and exploratory areas and the Fort Mojave Reservation is outside the three major flow systems associated with the project. The Paiute Tribe of Utah has tribal reservation lands in several locations in southwestern Utah; however, none are located within the indirect effects study area. There are other tribes, including those on nearby reservations in Nevada, Utah, and Arizona with traditional ancestral ties to the area. Those historic ties are described in Section 3.16, Cultural Resources.

3.18.1.2 Population and Demographics

Population Trends

Population growth trends among the counties since 1970 reflect important economic and demographic influences and events that contribute to current conditions (**Figure 3.18-2**). Lincoln, Juab, and Millard counties all experienced long-term population growth, while White Pine County experienced a cyclic pattern of declines and growth tied to mine closures and expansion, superimposed on growth associated with the opening of a state prison near Ely. Important influences affecting growth in Juab and Millard counties include the completion of I-15 between Las Vegas and Salt Lake City in the 1970s and more recent economic and population growth in the Salt Lake City-Orem metropolitan area, with growth spreading southward along the Wasatch Range. Juab and Millard counties recorded populations of 10,246 and 12,503, respectively, with most of the population being concentrated in the eastern portions of each county. Little population growth occurred over the past decade in the western portions of each county that are in the study area.[1]

Settlement patterns within the four rural counties are similar, with much of the population concentrated in and near a few established communities, such as Ely, McGill, Ruth, and Baker in White Pine County and Nephi and Mona in Juab County. All counties have resident populations living on farms, ranches, and residential acreages/tracts in unincorporated areas. Development in the outlying areas tends to be concentrated along streams and near springs in the valleys and flats, as those locations attracted settlers who homesteaded the area or acquired land through the BLM's Desert Entry program.

Baker, an unincorporated community situated in the Snake Valley in eastern White Pine County and located along the primary road access to the GBNP, is the only community in which a segment of the proposed pipeline ROW could be located. Along with nearby Garrison, Utah, and the Border Inn, a service station/restaurant/motel enterprise along U.S. 6/50 at the Nevada – Utah state line, Baker holds an important social and economic place in the region. Including nearby rural development, the Baker area is home to approximately 200 residents. Baker and the surrounding area has attracted a few new residents in recent years, primarily semi-retired and/or lifestyle migrants attracted by the area's social, environmental, and scenic amenities or people looking for a more relaxed rural setting. Typically, the new residents were previously acquainted with the area; for example, they may have previously visited the area during a

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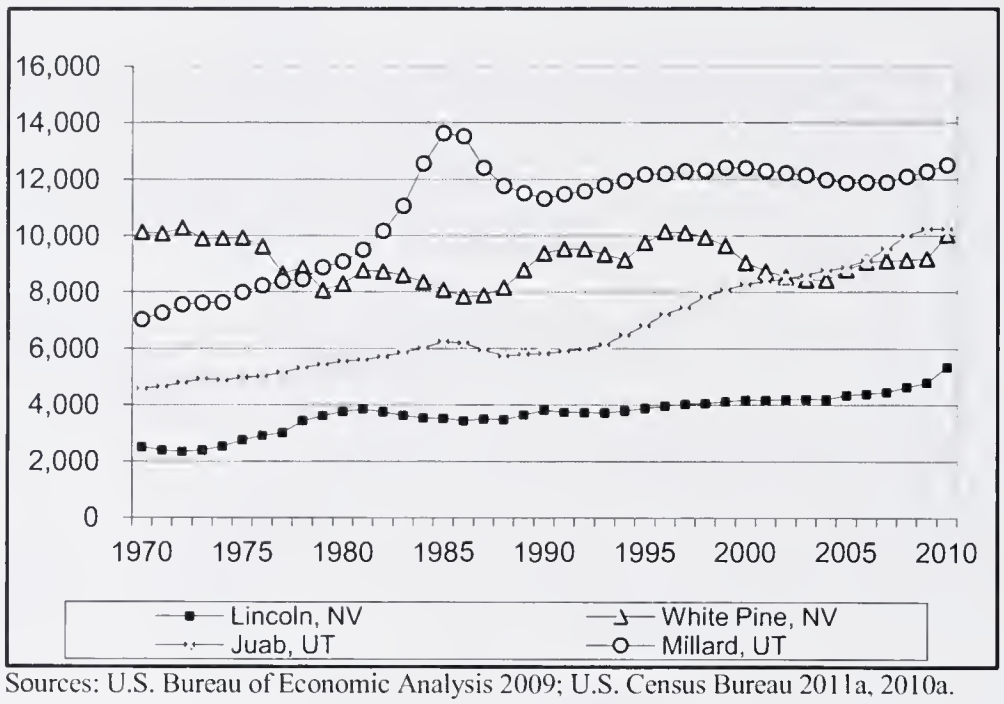
[1] Population data in these paragraphs are from the 2010 Census (U.S. Census 2011a).
[2] These communities are described in more detail in Section 3.18.1.7.

vacation. Several of them now operate small businesses in the community. At the same time, Baker and the remainder of the Snake Valley have also experienced out-migration of young adults pursuing education or employment.



Sources: U.S. Bureau of Economic Analysis 2009; U.S. Census Bureau 2011a, 2010a.

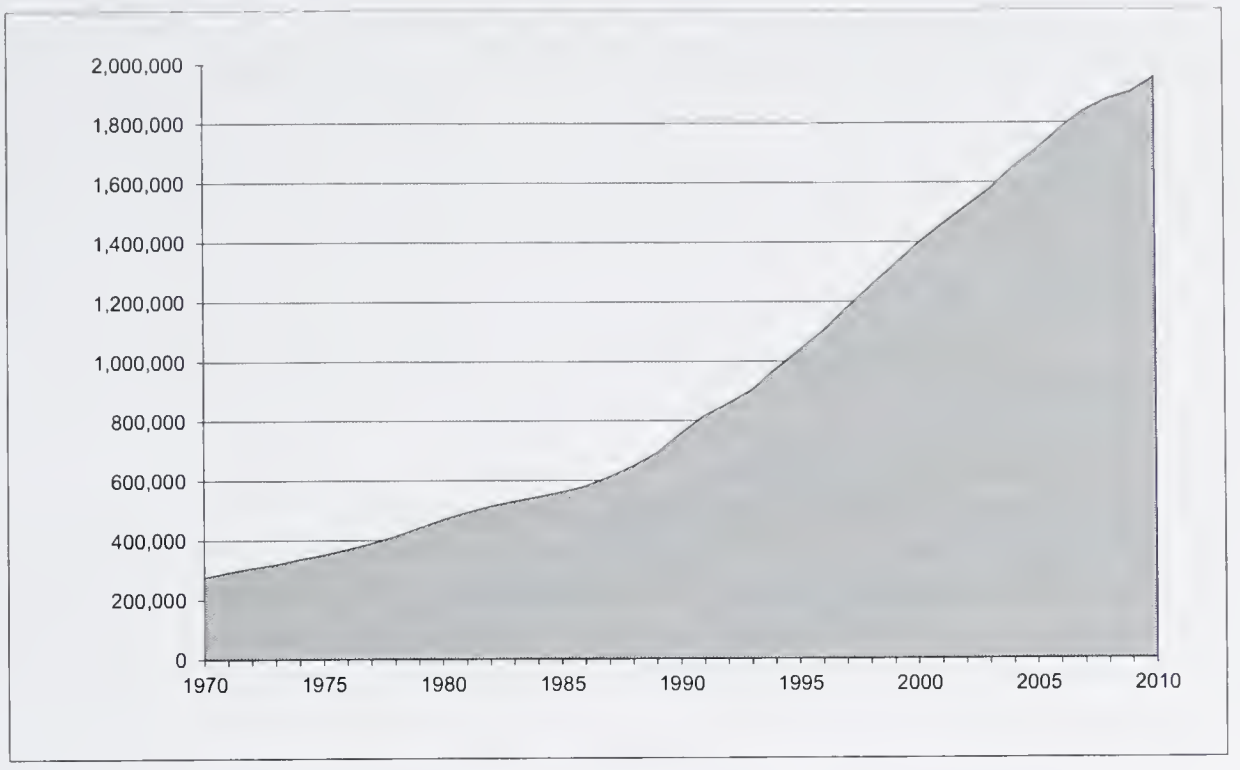
Figure 3.18-2 Total Population, Four Rural Study-Area Counties, By County, 1970 to 2010

Other communities and settlements in the study area include Callao, Trout Creek, Partoun, Gandy, and EskDale in Utah, rural residential development in White Pine County near GBNP and Baker, on Sacramento Pass and in Spring Valley, and the Coyote Springs master-planned development in southern Lincoln/northern Clark counties. All but the latter are located in the Snake Valley or Spring Valley hydrologic basins. The EskDale community is a religious community of about 80 residents, supported primarily by a thriving dairy farm and dairy cattle breeding/animal husbandry operation. Approximately 300 to 350 residents reside in Garrison and other areas of western Juab and Millard counties. Due to the limited amount of private land, the remaining groundwater development areas are sparsely inhabited.

The majority of Lincoln County's residents live east of the proposed pipeline ROW and proposed groundwater development basins, including those in the towns of Panaca, Pioche, and Caliente. The town of Alamo lies west of the pipeline ROW, but along with the Coyote Springs development, it is situated in the White River flow system.

As mentioned in Section 3.3, Water Resources, the Salt Lake Desert flow system includes portions of Elko County in Nevada, and Tooele, Beaver, and Iron counties in Utah. With the exception of the area in Tooele County, these areas are very sparsely populated, with population limited to residents of a few ranches. The area in Tooele County includes a portion of the Goshute Indian Reservation and the small historic communities of Ibapah and Gold Hill. The estimated total population of the area was approximately 150 to 175 in 2010.

Population trends in the four rural counties stand in stark contrast to that which has occurred in Clark County, where the resident population climbed more than 7-fold, from 277,230 in 1970 to 1,951,269 in 2010. During that period, Clark County's population growth achieved a long-term compounded annual growth rate of 5 percent (**Figure 3.18-3**), consistently ranking among the fastest growing metropolitan areas in the nation. Net population gains of more than 575,000 in Clark County between 2000 and 2010 accounted for more than 80 percent of the Nevada's statewide population growth of 702,294 residents during the same period, which is equivalent to a 3.1 percent compounded annual growth rate for the state. Following decades of uninterrupted growth, the lingering effects of the national economic recession were expected to result in a net decline in Clark County's population between 2009 and 2010; the Nevada State Demographer anticipated a net decline of approximately 50,000 residents (Nevada State Demographer 2010), although the expected decline wasn't evident in the population estimates and 2010 population counts reported by the U.S. Census. Utah registered a statewide increase of more than 530,000 residents between 2000 and 2010, representing a growth rate of 2.2 percent compounded annual growth rate.



Sources: U.S. Bureau of Economic Analysis 2009; U.S. Census Bureau 2011a, 2010a.

Figure 3.18-3 Clark County Population, 1970 to 2010

Population growth in Clark County has been focused in and around Las Vegas. The city of Las Vegas, the central city in the metropolitan area, has seen its population more than double since 1990, to nearly 584,000 in 2010. The population of Henderson climbed more than 4-fold during the same period, to nearly 258,000 in 2010, while the City of North Las Vegas gained more than 169,000 residents. Boulder City and Mesquite, both of which are outside of the Las Vegas Valley, gained 2,456 and 13,405 residents, respectively (U.S. Census Bureau 2011a, 1992). Substantial population growth also occurred in the unincorporated areas surrounding Las Vegas over the past decade. The Clark County Department of Comprehensive Planning estimated the population of unincorporated Clark County at more than 861,000 residents in 2008 (Clark County 2008a).

The national economic recession that began in late 2007 dramatically curtailed the pace of economic expansion and population growth in Clark County. Residential construction, which had been a vital driver of the region's economy, slowed dramatically, as record high numbers of units went into foreclosure and residential housing prices declined sharply. According to 1 real estate reporting service, the median sales price in Las Vegas has declined more than 55 percent from its peak of more than $281,000 in mid-2006 (Zillow 2011). The 2010 Census reported an overall housing vacancy rate of 15 percent for Clark County. New commercial and resort development also slowed, the slowdown in construction contributing to record-high unemployment that peaked at 15 percent in late 2010 (U.S. Bureau of Labor Statistics 2011). Las Vegas' gaming, convention, and entertainment industry also was impacted as the weaker economy resulted in convention cancellations and reduced discretionary travel and spending by visitors. Visitor and gaming statistics compiled by the Las Vegas Convention and Visitors Authority (LVCVA), including near 30 percent reductions in convention attendance and average daily room rates, combined with a decline of approximately $2.1 billion in gaming revenue, reflect the severity of the region's economic downturn (**Table 3.18-1**). Although some visitor metrics reported by the LVCVA revealed signs of nominal improvement in 2010, tourism continues to lag behind 2007 and the changes are not widely viewed as indicative of a broad economic recovery. Lay-offs, high unemployment, and the lack of job vacancies have not only stemmed the expansion, but also dramatically curtailed the flow of job seekers into the region.

Table 3.18-1 Las Vegas Tourism/Visitors Statistics, 2007 to 2010

	2007	2008	2009	2010
Visitor Volume (Millions)	39.2	37.5	36.4	37.3
Total Room Nights Occupied (Millions)	44.0	43.0	42.0	43.4
Convention Attendance (Millions)	6.2	5.9	4.5	4.5
Average Daily Room Rate	$132.09	$119.19	$92.93	$94.91
Gaming Revenue in Clark County (Billions)	$10.9	$9.8	$8.8	$8.9

Source: LVCVA 2011a.

The relative roles of natural increase and net migration in population change vary dramatically across the study area, as shown in **Table 3.18-2**. Net in-migration had been the driving force behind the growth in Las Vegas/Clark County, averaging more than 47,000 new residents per year between 2000 and 2008 and representing nearly 80 percent of the net growth. New residents have come from all states and many foreign lands. California is the most common origin of relocating residents and about 20 percent of new residents are foreign born (University of Nevada Las Vegas [UNLV]-CBER 2007; U.S. Treasury 2007).

Table 3.18-2 Components of Population Change, 2000 to 2008

	Natural Change	Net International Migration	Net Domestic Migration	Total Population Change *	Migration Share of Total (percent)
Clark, Nevada	116,692	68,427	311,685	490,211	78
Lincoln, Nevada	-60	17	861	733	>100
White Pine, Nevada	-32	46	30	18	> 100
Juab, Utah	996	7	788	1,745	45
Millard, Utah **	694	331	-1,284	-323	NA

* The total change is not the sum of the preceding columns due to statistical rounding.
** The basis of the estimated out-migration is not apparent and appears inconsistent with other economic and demographic data. However, the differences are also unlikely to be related to changes in the western portion of the county.
NA – not applicable because the net change is negative.
Source: U.S. Census Bureau 2009.

Net migration into Clark County declined precipitously as the current economic recession and housing finance crisis resulted in the loss of upwards of 100,000 jobs, many in construction, and adversely affected the housing market. U.S. Census Bureau estimates report that natural increase accounted for 16,566 (70 percent) of the net population change of 23,741 from 2008 to 2009, with net migration estimated at 7,544; the latter was less than 20 percent of the historical annual average migration of 47,000. Even as some unemployed residents were reportedly leaving Las Vegas, some observers suggest new residents are moving to Las Vegas, at least on a temporary basis, attracted by the large number and affordability of homes available for sale.

Net migration was responsible for all of the net population growth in Lincoln County and 45 percent of the net change in Juab County between 2000 and 2008. In White Pine County, net in-migration slightly more than offset the declines due to natural change among the local population. According to Census Bureau estimates, Millard County has experienced substantial net domestic out-migration since 2000[3].

Natural increase, defined as the net difference between the number of births and deaths among residents, is an important dimension of population change in Juab and Millard counties. In part, this pattern reflects the effects of a

[3] The basis for the estimated out-migration is not apparent and it appears inconsistent with other economic and demographic data, i.e., employment and residential construction trends. However, the differences are likely to be unrelated to changes in the portion of western Millard County in the project study area.

comparatively large number of younger households attracted to the area by affordable housing and the influence of the Church of Jesus Christ of Latter Day Saints (LDS) in Utah. Households affiliated with the LDS Church characteristically have higher than average birth rates and larger families. The relatively youthful population is evident in the median ages and high proportion of residents under 18 in the 2 Utah counties (**Table 3.18-3**). Among the 5 counties, White Pine County has the largest share of its population in the 18- to 64-year age category. Factors contributing to this pattern are recent increases in mining jobs, which attract a high portion of working adults, and the adult inmate population at the state prison near Ely.

Table 3.18-3 Age Distribution and Median Age of the Resident Population, 2009

County	Under 18 (percent)	18 to 64 (percent)	65 and Over (percent)	Median Age 2009	Median Age 2000
Clark, Nevada	26.3	62.9	10.7	34.5	34.4
Lincoln, Nevada	25.1	46.6	28.4	45.9	38.8
White Pine, Nevada	21.4	63.6	15.0	39.4	37.7
Juab, Utah	36.2	53.4	10.4	29.1	26.5
Millard, Utah	32.5	54.2	13.4	34.0	29.9

Source: U.S. Census Bureau 2010b, 2002.

The countywide demographic characteristics mask a trend common in many rural counties, which is the out-migration of young adults following graduation from high school to pursue higher education or economic opportunities. Comments by local residents and educators suggest this trend holds, particularly in the portions of Juab and Millard counties located in the study area. The general aging of the population, coupled with the outflow of younger residents, factor into declining enrollment trends observed in local public schools in recent years.

Despite a tendency to associate migration to Las Vegas and other sunbelt areas with retirees, demographic data indicate that a large portion of the migrants are younger singles and households. The median age of Clark County residents in 2009 was 34.5 years, only slightly higher than in 2000, even as population climbed by over 500,000 residents. In 2009, fewer than 11 percent of Clark County residents were 65 or over, while more than 26 percent were under the age of 18.

The racial and ethnic compositions of the local populations reflect the influences of migration, historical settlement patterns, and economic factors. Clark County's resident population is about 61 percent white, with 39 percent identifying themselves as being multiracial or of other races; the latter is 15 percentage points higher than the national average. Residents identifying themselves as Hispanic or Latino comprised 29 percent of the Clark County population in 2010, which is again approximately 15 percentage points above the national average. As compared to Clark County and the national averages, whites constitute considerably higher proportions of the resident populations in each of the four rural counties (**Table 3.18-4**). At the same time, Hispanics and Latinos comprise smaller shares of the populations in the four rural counties.

Table 3.18-4 Racial and Ethnic Composition, 2010

	Race (Percent of the Population)			Hispanic or Latino Ethnicity (Percent of the Population)
	White	American Indian and Alaska Native	Other Races, Two or More Races	
U.S.	75.2	0.9	23.9	13.7
Clark County, Nevada	60.9	0.7	38.4	29.1
Lincoln County, Nevada	91.1	1.1	7.7	6.2
White Pine County, Nevada	85.5	4.2	10.3	13.2
Nevada	66.2	1.2	32.7	26.5
Juab County, Utah	95.9	0.9	3.2	3.7
Millard County, Utah	87.6	1.0	11.4	12.8
Utah	86.1	1.2	12.7	13.0

Source: U.S. Census Bureau 2011b.

In 2010, American Indian and Alaskan Natives accounted for between 0.7 percent (Clark) and 4.2 percent (White Pine) of study area residents.

All or substantial portions of four American Indian reservations and colonies are located in Clark and White Pine counties: the Ely Reservation, Goshute Reservation, Las Vegas Colony, and Moapa River Reservation. All four gained population between 2000 and 2010. The Ely Reservation registered the largest absolute net gain during the decade; 69 residents (**Table 3.18-5**). Most of the inhabitants of these reservations are the present generation of Western Shoshone and Southern Paiute tribes which historically were hunters and gatherers following migration patterns through the region tied to the seasonal availability of food and other important resources (see Section 3.17, Native American Values).

Table 3.18-5 Resident Population on American Indian Reservations In/Near the Study Area

Reservation/Colony (*Tribal Affiliation*)	1980	1990	2000	2010	Change 2000 to 2010 (Absolute)
Ely Reservation, Nevada – *Shoshone*	76	79	133	202	69
Confederated Tribes of the Goshute Reservation, Nevada-Utah, *Goshute, Paiute, and Bannock*	45	99	105	143	38
Moapa River Reservation, Nevada - *Paiute*	185	375	206	260	54
Las Vegas Colony, Nevada – *Paiute*	113	80	108	154	46

Source: U.S. Census Bureau 2011c, 2002.

Four other reservations are located in nearby surrounding counties, but all are quite removed from the project area.[5]

Projected Long-Term Population Growth in the Study Area

Long-term population projections are presented for the five-county study area in **Table 3.18-6**. These projections primarily reflect on a continuation of historic trends, unconstrained by legal, environmental, or political factors. In other words, they are generally reflective of the future in economic development and growth influences, including those associated with Congressionally approved land disposal actions in southern Nevada, but do not reflect information or assumptions regarding specific economic activities. The projections for the two rural Nevada counties, which portray little or no long-term economic growth, are viewed with skepticism locally, particularly in Lincoln County where public land sales have created an expectation of long-term growth.

Five series of projections for Clark County are presented above (**Table 3.18-6** and **Figure 3.18-4**): three reflecting the pre-recessionary economic and demographic outlook in mid-2008 and two released in 2010. The two 2010 series reflect a perspective on the uncertainties introduced by the economic recession for long-term growth in Clark County. Under the most aggressive of these projections, prepared by the Nevada State Demographer in 2006, Clark County would gain nearly 1.55 million additional residents between 2010 and 2030. Recent projections, prepared by the Nevada State Demographer in 2010, portray potential population growth ranging between 77,000 and 1.16 million residents by 2030. The range in the Nevada State Demographer 2010 projections reflects differences in assumptions regarding the strength and timing of future economic recovery. Whereas the low growth scenario projects only limited gain, the high growth scenario effectively portrays a resumption of pre-recession growth.[6]

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[5] The Fort Mojave Reservation and Off-Reservation Trust Land, AZ--CA--NV, includes 6.2 square miles of land in extreme southern Clark County, quite removed from the project area. The Paiute Reservation is located in southwestern Utah and the Skull Valley Reservation is in west-central Utah. The Duckwater Reservation is wholly in Nye County, but the tribe is seeking to establish historic use of some lands in White Pine County.

[6] The long-term population projections for Clark County are included in the description of the affected environment because they play an important role in the ongoing public dialogue regarding the proposed project, particularly as they relate to SNWA's long-term water needs. By reporting these projections, the BLM is not validating, approving, or disputing their reasonableness, the underlying economic conditions associated therewith, or the "need" for additional water supply as established by SNWA. Furthermore, an independent determination by the BLM regarding projected demand is not within the agency's responsibility or authority when processing a right-of-way application submitted by a party satisfying minimum conditions for applicants. SNWA satisfies those conditions.

Table 3.18-6 Population Projections to 2030 for Study Area Counties

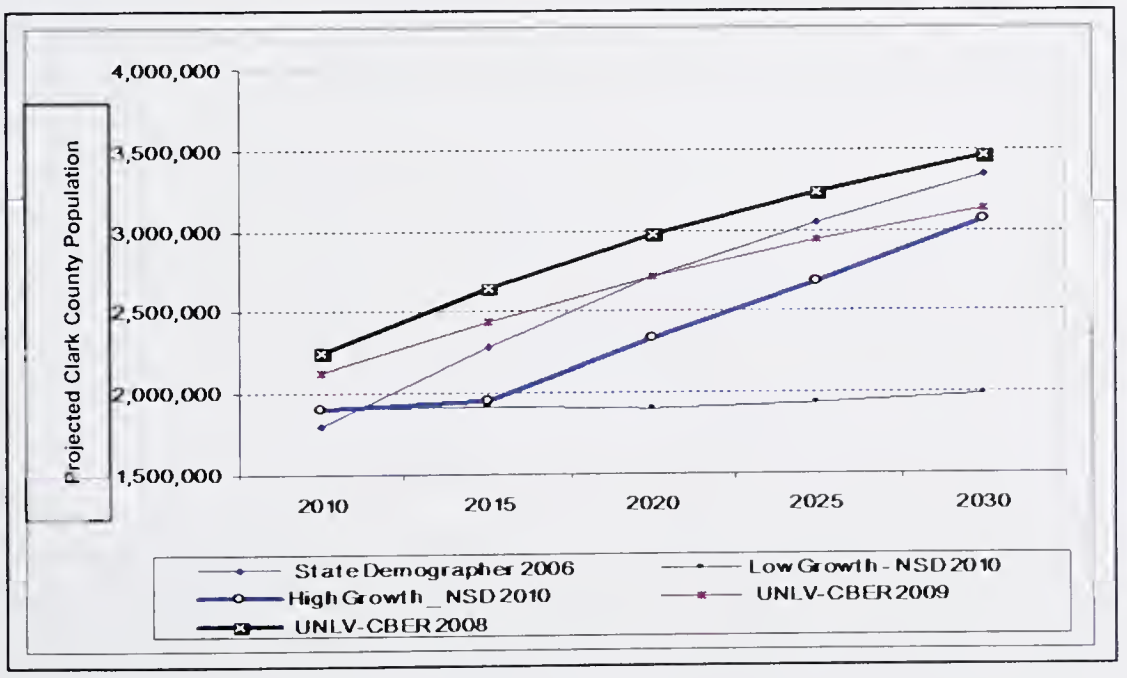
County (Source)	2010	2015	2020	2025	2030
Clark, Nevada					
Nevada State Demographer 2006	1,796,380	2,281,997	2,718,502	3,045,813	3,344,390 (e)
Low Job Growth (Nevada State Demographer 2010)	1,902,502	1,920,674	1,905,694	1,931,160	1,979,045
High Job Growth (Nevada State Demographer 2010)	1,902,502	1,947,432	2,325,456	2,674,914	3,066,872
UNLV-CBER 2008	2,253,000	2,649,000	2,978,000	3,243,000	3,454,000
UNLV-CBER 2009	2,122,000	2,446,000	2,715,000	2,933,000	3,126,000
Lincoln, Nevada					
Nevada State Demographer 2008	4,499	4,988	5,308	5,449	5,500 (e)
Nevada State Demographer 2010	4,238	4,204	4,195	4,264	4,384
White Pine, Nevada					
Nevada State Demographer 2008	10,453	10,990	11,081	11,265	11,440 (e)
Nevada State Demographer 2010	9,495	9,162	8,779	8,475	8,259
Juab, Utah (Utah Governor's Office of Planning and Budget 2008)	10,519	12,353	14,158	16,055	18,004
Millard, Utah (Utah Governor's Office of Planning and Budget 2008)	13,863	15,404	16,868	18,343	19,682

Notes:

1) The above projections were prepared by the Nevada State Demographer, UNLV-CBER, and Utah Governor's Office of Planning and Budget. The projections from the Nevada State Demographer do not include explicit assumptions regarding future development and population growth associated with the Coyote Spring or Toquop/Lincoln County Land Act projects.

(e) = estimated by the BLM contractor to extend the base projections from 2028 to 2030 to provide forecasts for a consistent period.

Sources: Nevada State Demographer 2010, 2006; UNLV-CBER 2009, 2008; Utah Governor's Office of Planning and Budget 2008.



Sources: Nevada State Demographer 2010, 2006; UNLV-CBER 2008, 2009.

Figure 3.18-4 Projected Long-Term Population of Clark County

Combined net population growth of approximately 12,000 to 15,000 residents is projected for the 4 rural counties by 2030. The majority of the net growth is anticipated to occur in Juab and Millard counties and primarily would be tied to the continued growth along the Wasatch Front. The range noted above reflects changes in the Nevada State Demographer's 2008 and 2010 projections for Lincoln and White Pine counties. Whereas the earlier projections anticipated growth in both Lincoln and White Pine counties, the more recent projections called for little growth in Lincoln County and declines in White Pine County.

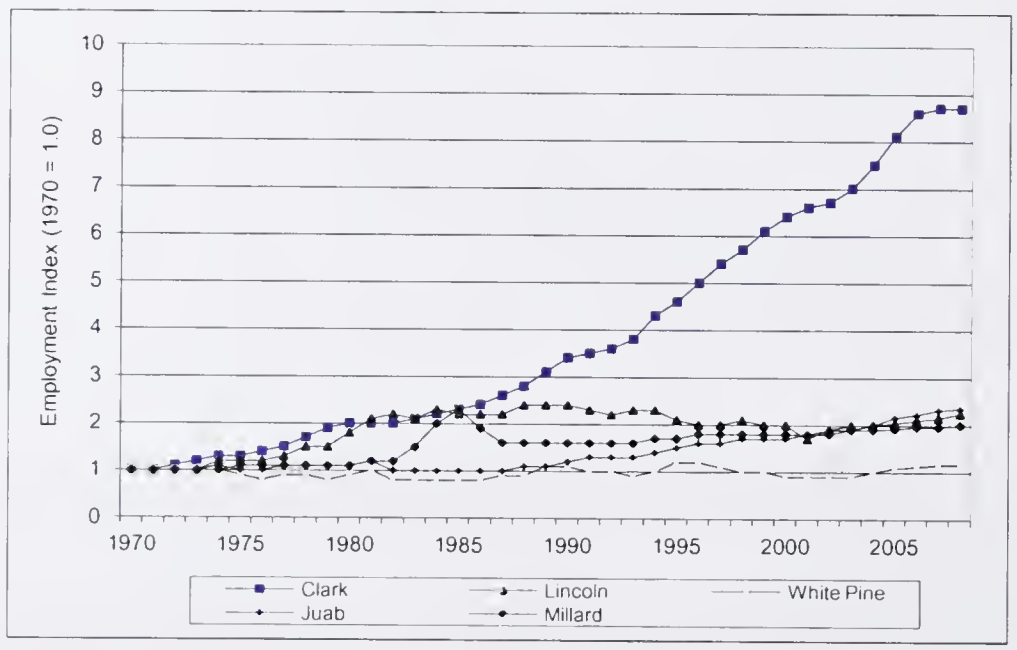
The projections for Lincoln County are noteworthy because they apparently do not include allowances for any substantial level of future development in the Lincoln County portions of the Coyote Spring development or the Toquop/Lincoln County Land Act planned unit development project in the extreme southeastern portion of the county. The Lincoln County Planning and Zoning Department estimated that these developments could ultimately increase local population by 250,000 (Lincoln County 2008). As would be true in the Las Vegas Valley, conveyed groundwater from the northern part of Lincoln County would enable growth, but other factors such as the future market for second and retirement home development, lifestyle migration, and relocation of commuters to the Las Vegas Valley would be the likely factors that would drive population growth.

White Pine County's prospects for long-term growth are uncertain. Mining, operation of state correctional facilities, tourism, and agriculture are expected to remain essential elements of the economic base for the foreseeable future. Several White Pine County locations offer good potential for wind energy generation. The first commercial scale wind project to take advantage of that potential, the Spring Valley Wind project, was under construction in the spring of 2011. However, plans for the construction and operations of new coal-fired generating capacity that were once anticipated in White Pine County, have been delayed and possibly cancelled, due to air quality concerns and uncertain demand (Rajala 2009).

3.18.1.3 Economic Overview

Employment and Unemployment

Economic conditions of the study area counties and the changes in such conditions over time, closely mirror the previously described population trends. Total employment in Clark County increased 8-fold between 1970 and 2008 and more than doubled since 1990 (**Figure 3.18-5**), reaching 1.16 million jobs in 2008. Prior to the current economic recession, the increase in job opportunities and demand for labor had been a major influence behind the strong in-migration of residents to the region. The scale of change, as well as the absolute number of jobs in Clark County, contrasts sharply with those of the rural counties. Together, the 4 counties registered total employment of 19,019 jobs in 2007, a net increase of 3,553 jobs or 23 percent compared to 1990. The majority of the gains occurred in Juab and Millard counties and were concentrated in the eastern parts of those two counties, some distance from the potentially affected areas.



Sources: U.S. Bureau of Economic Analysis 2010b, 2009.

Figure 3.18-5 Comparative Change in Total Employment, 1970 to 2008

The economic expansion in the years prior to the recession had pushed unemployment rates to near record lows. The recession brought about a sharp reversal of fortunes, with the number of unemployed and unemployment rates rising sharply. Average annual unemployment more than tripled in Clark County between 2007 and 2010, climbing by nearly 95,000 job seekers, to more than 142,000 at the end of 2010. The number of employed residents fell by approximately 60,000 during that same period. The number of unemployed and unemployment rates increased in the other study area counties as well due to the recession, increasing from 162 to 397 between 2007 and 2010 in Millard County, for example. Lincoln County's labor force also experienced double-digit unemployment rates beginning in mid-2009 and continuing through 2010 (**Table 3.18-7**).

Table 3.18-7 Local Labor Market Conditions, 2007 to 2010

	2007	2008	2009	2010	Change 2007 to 2010
Number of Unemployed					
Clark, Nevada	44,567	91,450	117,413	139,497	94,930
Lincoln, Nevada	76	79	164	225	149
White Pine, Nevada	180	225	367	459	279
Juab, Utah	135	209	357	391	256
Millard, Utah	162	197	329	397	235
Unemployment Rate (percent)					
Clark, Nevada	4.7	6.6	12.0	14.4	+ 9.7% pts.
Lincoln, Nevada	4.4	5.4	9.6	13.2	+ 8.8% pts.
White Pine, Nevada	3.8	4.7	7.4	9.3	+ 5.5% pts
Juab, Utah	3.3	5.0	9.0	9.9	+ 6.6% pts.
Millard, Utah	2.6	3.2	5.1	6.3	+ 3.7% pts.
U.S. – National Average	4.6	5.8	9.3	9.6	+ 5.0% pts.

Source: U.S. Bureau of Labor Statistics 2011.

An adjunct of the relatively small size and limited economic diversity of the rural areas is an inherent susceptibility to economic distress and diminished resilience to adverse changes affecting one or more elements of their economic base. Among some White Pine County residents and officials, SNWA's water rights applications have contributed to a lack of economic development and growth over the past several decades (Nevada Rural Development Council 2010). The lack of economic diversification and recognition of economic development challenges facing the rural counties raise concerns regarding fiscal distress from prospective cutbacks or loss of existing employers, such as the Nevada Test Site and Robinson Mine, the latter reportedly having a remaining mine life of less than 10 years (Quadra Mining Ltd. 2007). The national recession, its impacts on construction and tourism in Clark County, and the subsequent adverse effects on the state's fiscal health and funding for services and programs added to these concerns. In White Pine County, cutbacks in state services, including discussion of possible closure of one or more state correctional institutions, brought about renewed urgency to efforts to retain and bolster existing businesses while actively promoting economic development. Renewable energy generation, particularly wind, second home development, and growing higher value agricultural products are among the economic development opportunities viewed locally as economically viable (White Pine County 2006).

Economic Base

The successful branding and global marketing of Las Vegas as one of the world's premier entertainment, recreation, and conference/convention destinations has been a driving force behind Clark County's past economic expansion and a crucial element of the vision for its future. The gaming and hospitality industry directly employs many workers and supports an extensive service industry. Between 1990 and 2009, the Las Vegas lodging industry added more than 75,000 rooms, more than doubling the room inventory as the annual number of visitors climbed to 39.2 million in 2007, before declining to 36.4 million in 2009 as the economic recession took a toll on convention, conference, and discretionary personal travel. Trends in annual gaming revenue in Clark County paralleled the patterns in visitor volume, climbing to $10.9 billion in 2007 before dropping to $8.9 billion in 2010 (LVCVA 2011a,b, 2009).

The construction industry, driven by rapid economic and population growth, has been another economic cog in Clark County. Labor demand associated with commercial construction and the operations of the resort industry were another major factor in the region's economic expansion and labor force in-migration. That demand triggered yet further demand for labor to build housing and public infrastructure. A 2004 economic study estimated that every job in the construction industry supported an average of 1.08 additional jobs in the local economy (Hobbs, Ong & Associates 2004).

Consumer demands of residents and visitors to Las Vegas promoted significant expansion of retail trade, as well as health care, other personal services, public education, and other local public services. Military and other federal government agencies are another element of Clark County's economic base and local economic development efforts have been successful in recruiting light industry, financial services, and other firms, thereby providing some measure of economic diversification.

The pace of new commercial and residential construction, home sales, and sales prices subsequently weakened beginning in late 2007 and early 2008, and several ongoing or announced projects were curtailed and postponed. Thereafter, the local housing market was beset by problems associated with sub-prime mortgage lending and adjustable rate mortgages. As a result, the number of homes in or threatened by foreclosure rose to all-time highs. To some, it foreshadowed a protracted period of economic adjustment; to others it was a welcome respite, which would soon transform into the next housing shortage once the new projects were completed (Southern Nevada Home Builders Association 2007; Economicrot 2007; Las Vegas Review Journal 2007; In Business Las Vegas 2007).

In the midst of the economic prosperity associated with growth, concerns arose regarding the susceptibility of the economy to slowdowns in the pace of new development. Such slowdowns posed potentially significant economic implications for the regional and statewide economies in terms of rising unemployment and demands for some public services at a time of declining public sector revenues. Those concerns proved well founded. More than 55,000 construction jobs have been lost over the past 3 years, driving losses in other sectors of the economy. State and local government revenues have also fallen precipitously. The incidence of these adverse fiscal effects has been statewide because Nevada's fiscal structure was heavily reliant on the gaming and construction related sales tax revenues to support various distributions to the non-metropolitan counties and public education.

Agriculture and government employment play vital roles in all four rural counties. In 2008, farm employment accounted for between 3.1 percent (White Pine) and 14.1 percent (Millard) of all employment (**Table 3.18-8**). Public sector employment, including public education, had increased in Clark County in response to population growth and accounted for 9.7 percent of the total employment in 2008. Public sector employment accounted for 13.5 percent and 16.5 percent of all employment in Juab and Millard counties, respectively, and more than 28 percent in Lincoln and White Pine counties. The high shares of government employment in Lincoln and White Pine counties reflect the location of several state institutions in those counties, as well as a substantial federal presence associated with land and natural resource management activities.

Table 3.18-8 2008 County Employment, By Major Category

Geographic Area	Full and Part Time Employment by Category				Percent of Total Employment		
	Farm	Non-Farm Private	Government	Total	Farm	Non-Farm Private	Government
Clark, Nevada	244	1,052,408	112,864	1,165,516	0.0	90.3	9.7
Lincoln, Nevada	133	1,437	674	2,244	5.9	64.0	30.0
White Pine, Nevada	161	3,580	1,502	5,243	3.1	68.3	28.6
NEVADA	**4,788**	**1,460,009**	**173,207**	**1,638,004**	**0.3**	**89.1**	**10.6**
Juab, Utah	351	3,972	687	5,010	7.0	79.3	13.7
Millard, Utah	958	4,627	1,120	6,772	14.1	68.3	16.5
UTAH	**18,921**	**1,453,673**	**229,899**	**1,702,493**	**1.1**	**85.4**	**13.5**

Source: U.S. Bureau of Economic Analysis 2010b.

The dependency on agriculture and public sector employment is stronger in the Snake Valley portions of Juab and Millard counties, where it is not uncommon for a household to derive income from both sources, with one member engaged in farming/ranching and another working in education or government, for example. In fact, some residents note that having an "off-the-ranch" income is economically imperative, particularly in recent times when agricultural production and income have been adversely affected by the extended drought.

Farming and Ranching

The employment data presented above provide insights and perspectives into the economic structure of the rural counties. Agriculture is an important element of the economic base of the four rural counties, even though farming and ranching may not be major income generators on an accounting basis. Farming and ranching provide livelihoods for many households, contribute to the local tax base supporting local government and public education, and also provide a source of labor for other employers. Agriculture also supports other local businesses through purchases of farm equipment, fuel, veterinary services, and other goods and services – a 2008 study estimated a secondary impact of $260 in local economic output in White Pine County for every $1,000 in direct output by local farms and ranches, with each direct job also supporting an average of 0.70 jobs elsewhere in the county (Fadali and Harris 2008). Although farm income is sensitive to outside influences and varies year-to-year, the farm-based population tends to be connected to the land in ways that anchors it to the area more so than households associated with other elements of the economy. **Table 3.18-9** characterizes the local agriculture industry using information from the 2007 Census of Agriculture (USDA 2009a,b) and conversations with local ranchers in the area.

- Altogether, there were 1,426 farms and ranches in the 5-county study area, nearly half of which were in Millard County. Together, the four rural counties accounted for more than 85 percent of the study area total.
- In the 5-year period between 2002 and 2007, the number of farms and ranches declined in Clark (-60), Lincoln (-11) and White Pine (-24) counties but increased in Juab (+99) and Millard (+57) counties.
- Collectively, the farms and ranches in the 5 counties encompass an estimated 1.16 million acres of land, a net gain of more than 11.1 percent compared to 2002. Most of the net gain occurred in Millard County.
- Among the 5 counties, Millard County hosts the largest agriculture sector, with local farms and ranches registering more than $160 million in cash receipts from livestock, products, and crop sales in 2007. Farms in Clark County registered more than $24 million in such receipts while the other 3 counties each registered less than $16 million in farm receipts.
- About one-third of all farms and ranches in the 5-county area were smaller than 50 acres in size, while more than 40 percent were 180 acres or larger.
- About 43 percent had no sales of livestock or products or less than $5,000 in such sales, while 24 percent had annual sales of $50,000 or more.
- Forty-three percent of all operators list farming as their principal occupation, which is a decline of nearly 10 percent in the last 5 years.
- Many of the farms and ranches have one or more household members employed off the farm.
- The total amount of land in agriculture declined in Lincoln, White Pine, and Juab counties between 2002 and 2007.
- About half of all farms in the 5 counties reported raising cattle and/or sheep, with those raising cattle outnumbering those raising sheep by about a 7-to-1 margin.
- A combined total of approximately 186,000 acres of agricultural land was irrigated in 2007; again the majority of which was located in Millard County.
- Across the 5-county region, a total of 267,309 acres of land were reported under cultivation, producing a variety of crops, or as pasture. The bulk of the cropland (58 percent) was in Millard County. The major crops included alfalfa, corn, barley, and wheat.
- Detailed sub-county reports of the area of cropland from the 2007 Census are not readily available. However, recent data based on satellite photography indicates a combined total of approximately 34,300 acres in Spring and Snake valleys; 20,300 acres in White Pine County, 10,000 acres in Millard County, and 4,000 acres in Juab

County (USDA Cropscape 2012). These totals represent approximately 38 percent, 8 percent, and 10 percent of the total estimated cropland in each county derived from the same source.

Table 3.18-9 Summary of Local Farming and Ranching, 2007

	Clark	Lincoln	White Pine	Juab	Millard
Number of Farms	193	98	97	335	703
Acres in Farms	88,381	46,271	196,986 (c)	260,444	566,692
Principal Occupation of Owners/Managers					
Farming	78	61	49	102	336
Other	115	37	48	233	367
Farms by Size					
1 to 9 acres	102	5	10	19	45
10 to 49 acres	42	30	16	72	139
50 to 179 acres	24	30	20	102	161
180 or more acres	25	33	51	142	358
Farms by Value of Sales					
Less than $5,000	125	30	30	169	253
$5,000 to $49,999	53	43	29	123	231
$50,000 and Over	15	25	38	43	219
Livestock Statistics					
Farms With Cattle/Calves	67	74	52	151	326
Head of Cattle (inventory)	5,018	16,243	22,027	18,202	74,005
Farms With Sheep/Lambs	16	2	14	30	37
Head of Sheep (inventory)	236	(D)	11,182	7,444	4,651
Land Used for Crops					
Total Cropland (acres)	6,220	17,903	23,756	65,702	153,728
Harvested Cropland (acres)	2,733	15,454	(D)	27,278	96,473
Irrigated Land (acres)	6,511	18,320	30,877	27,118	103,272

(e) – Estimated based on available information (D) – Not reported.

Source: USDA 2009b.

Table 3.18-10 summarizes farm income and expenses in 2007 for farms in the study area. Note that the data reflect a period when the area experienced the effects of an extended drought.

Table 3.18-10 Farm Income and Expenses, 2007 (x $1,000)

	Clark	Lincoln	White Pine	Juab	Millard
1. Cash receipts from livestock and products	$21,094	$6,246	$10,270	$9,663	$110,334
2. Cash receipts from crops	$2,978	$6,198	$2,858	$6,085	$50,747
3. Other income	$1,436	$685	$727	$3,782	$8,545
4. Production expenses	$27,789	$9,684	$13,108	$18,277	$113,612
5. Value of inventory change	-$638	-$1,832	-$2,822	$455	$2,025
6. Net income of corporate farms	-$596	$474	-$68	$273	$9,919
7. Net farm proprietors income (1+2+3-4+5-6)	-$2,323	$1,139	-$2,007	$1,435	$48,120

Source: USDA 2009b.

- In 2007, the combined net income of individual farmers and ranchers in Clark and White Pine counties was negative. Operators in Lincoln and Juab counties had a modest positive income and those in Millard County realized a collective net income of $48 million.
- Production expenses, substantial portions of which are beyond an individual farmer or rancher's control, consumed most if not all of the receipts generated from operations.
- Energy costs, including gasoline, diesel, propane, and electricity, are among the major production expenses for farmers and ranchers. A substantial portion of these costs is the pumping and distribution costs associated with irrigation. Irrigation costs tend to increase as a function of lift (the height or distance water is lifted).
- Energy costs have risen sharply in recent years, both in terms of direct commodity costs and indirectly in terms of transportation and shipping costs, and have contributed to the rising costs of fertilizers, other chemical products, and feed. Rising feed costs are in part a reflection of shifts in production patterns and markets related to the interest in ethanol production.
- Agriculture production on private lands in the region was historically constrained by the availability of surface and shallow subsurface water for irrigation and livestock watering. The introduction of diesel-powered pumps and groundwater wells expanded the productive areas. Crop production and the amount of lands in production increased further following the electrification of the valley and introduction of mechanized irrigation systems. In 2007, approximately 16 percent of all land in farms and ranches in the 5 counties was reportedly irrigated.
- Higher rates of groundwater withdrawal facilitated by electrically powered pumping have raised concerns that pumping rates exceed the general use and yield parameters in effect when irrigation wells were approved. In addition, the area has recently experienced protracted drought resulting in noticeable declines in groundwater levels in irrigation wells.
- Many local ranchers rely on access to grazing on public lands to sustain their operation. Grazing on the public lands allows ranchers to use available irrigated lands to grow hay for winter feed or sale as a cash crop. Ranchers have faced reduced stocking rates on public lands to help protect rangeland health during the extended drought period affecting the Great Basin over the past decade.
- Most of the private pasture and cropland in the rural areas is situated along the streams and in the alluvial areas. A substantial share of this land is sub-irrigated by shallow subsurface water flows linked to precipitation and snowmelt in the higher elevation mountain ranges in the region.
- Agriculture is an economic mainstay of the local economies/communities in western Juab and Millard counties (Snake Valley) and the rural areas of White Pine and Lincoln counties, particularly Spring Valley, Snake Valley, Eagle Valley, and around Panaca, Alamo, and Hiko.

The study area includes two large ranches with unique economic and social significance: the Cleveland Ranch in Spring Valley and the EskDale Dairy in Millard County. The significance of the former stems from its role in supporting the Bishop's Storehouse, a combination welfare assistance and disaster relief program operated by the LDS Church. Beef produced on the ranch is consigned to the Bishop's Storehouse, accounting for approximately one-half of all beef distributed through the program each year (LightPlanet 2007).

The EskDale Dairy is the principal economic enterprise supporting the EskDale community. The dairy is an integrated operation, utilizing alfalfa, corn, and other crops grown on nearby fields as feed for the herd. Milk produced at the dairy is trucked to Logan, where it is used for cheese production. The dairy herd plays a critical role in a successful, award-winning Holstein breeding program and support veal production. The dairy, farm, and breeding programs employ many members of the EskDale community and the revenue generated by the activities go into the "common fund" that is the primary income source for the community (Anderson 2007; EskDale Dairy 2007).

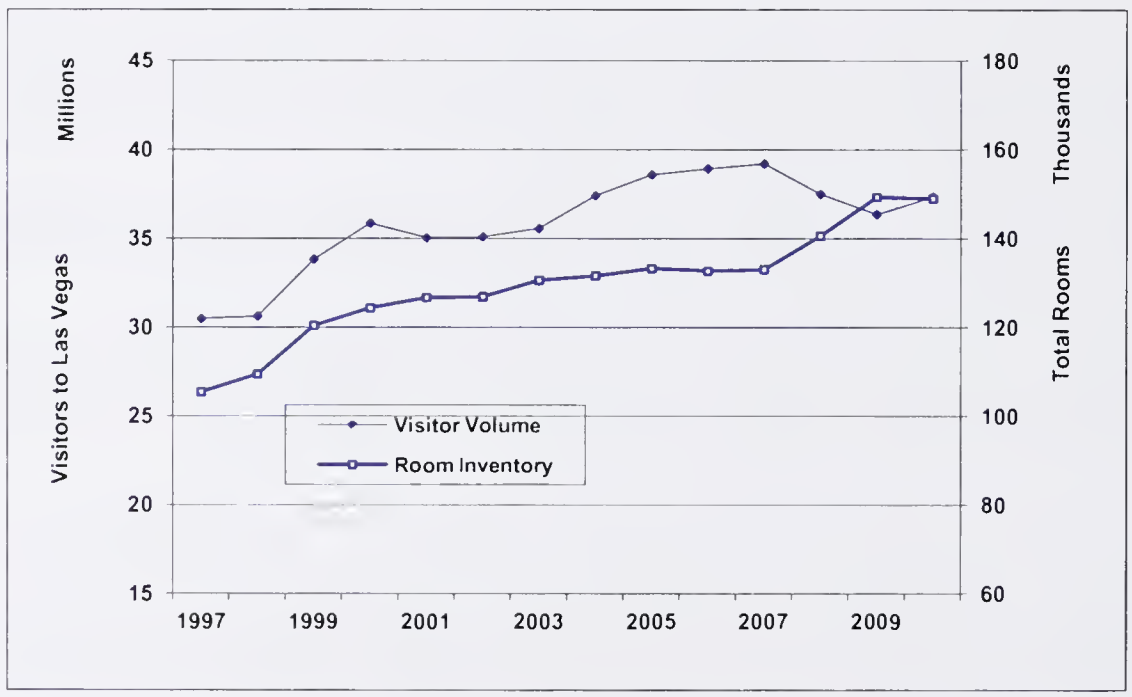
The roles of larger ranches in the economic and social structure of the region have taken on added significance over time due to the senior water rights typically associated with the land. As in other areas across the west, the rising value of the water rights generates substantial economic incentives, or pressures depending on one's perspective, to sell. Landowners without family interested in actively farming or ranching may choose to sell, potentially realizing prices far higher than that supported by the productive capacity of the land from an agricultural perspective. The SNWA has purchased a number of ranches in the Spring Valley. Similar sales and inquiries of interest to sell by other development

interests have been reported across the region. Such sales raise economic and social concerns within the local communities, including the effects of potential exportation of appropriated water rights and implications for more junior water rights in the basin due to reduced recharge; the effects of such sales on the ad valorem tax status of the lands as it relates to county fiscal conditions; and a weakening of the established social structure.

Tourism and Recreation

Tourism and recreation, in its many forms, are important elements of the rural economics, the foundation of the Clark County/Las Vegas economy, and vitally important to Nevada's statewide economy and fiscal health as well. Visitor outlays on gaming, lodging, eating and drinking, other entertainment, transportation, and other goods and services in Las Vegas total in the tens of billions of dollars each year. Between 1997 and 2007 annual room tax collections more than doubled from $98.2 million to $219.7 million. Long-term growth in the number of visitors, including millions of convention attendees each year, fueled a boom in casino and resort construction, and gains in employment, and thereby contributed to a major residential construction boom.

Las Vegas' convention and tourism industry was affected dramatically by the national recession that began in 2007 (**Figure 3.18-6**). The recessionary effects began to be apparent in mid-2008 when monthly visitor volume was more than 3.0 percent below the preceding year. Declines in monthly visitor volume of 10 percent or more, again on a year-over-year basis, were recorded in September, October, and December of 2008 and in January 2009. Total visitor volume for 2008 ended at 37.5 million, down 4.4 percent from the preceding year. Annual gross gaming revenue, which fell nearly $1.1 billion to $9.8 billion in 2008, served as another indicator of the recession's severity. Further declines in visitor volume and gaming revenue were registered in 2009. However, modest increases were posted in 2010.



Source: LVCVA 2011b.

Figure 3.18-6 Annual Visitor Volume and Total Room Inventory for Las Vegas, 1997 to 2009

A paramount interest in the Las Vegas community concerns the timing and strength of economic recovery in light of ongoing developments in the community. Several resort and commercial construction projects were undertaken on pre-recession conditions. The largest of these added nearly 6,000 rooms to the city's inventory at the end of 2009, placing additional pressures on the market and room rates. Weaker returns and cash flows for casino properties could potentially jeopardize presently outstanding financing commitments and limit financing for other projects. Lower room rates, gaming revenues, and visitor and consumer spending have fiscal implications for local governments and other public entities statewide, including the SNWA, which derives a portion of its funding for capital improvements from sales taxes.

Outdoor recreation and tourism, both of which are dependent on access to public lands, also are important elements of the rural area economics. Locally, outdoor recreation and tourism include travelers passing through the area, visitors and residents attending special events and festivals or visiting one or more historic or developed recreation sites, OHV users, resident and non-resident hunters and anglers, hikers, wildlife watchers, photographers, and other outdoor enthusiasts. Expenditures by these visitors for lodging, dining, fuel, equipment, and other goods and services help support the local hospitality and retail industries.

Hunting and fishing on public and private lands in the region are an important source of economic contributions to the local economy. Much of the activity is by residents, but spending by non-local and out-of-state residents, including guide, outfitting, access and tag fees, benefit locally based outfitters, and private landowners including several in White Pine County. Non-local hunters are an important market for local motels, restaurants, bars, grocers, and other retailers, as well as taxidermy and game meat processing services. Much of the income earned by local outfitters indirectly supports other businesses in the community.

More than one in four Nevada residents and nearly one in three Utah residents actively engage in wildlife watching as a leisure time pursuit. The importance of such non-consumptive enjoyment of wildlife is increasingly being recognized by state wildlife management agencies, as well as local tourism and economic development agencies. Birders and other wildlife watchers who visit the NWRs and public lands in the region are recognized as an important outdoor recreation user group in the Baker/ GBNP area.

Sportsmen and wildlife watchers make significant expenditures while engaging in their pursuits. According to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, average annual expenditures in Nevada ranged from $528 for wildlife watchers to $2,049 per resident hunter. Average expenditures by Utah anglers and hunters were slightly lower than those by Nevadans, but the average expenditures by Utahans engaged in wildlife watching were higher. Average expenditures by non-residents are considerably higher as a result of travel, higher non-resident license costs, and the costs of guides and outfitters. With the expenditures by non-residents, total estimated annual expenditures were $637 million in Nevada and $1.2 billion in Utah (USFWS 2007).

Closely aligned with recreation activity on public lands, is the harvesting and collection of reasonable amounts of certain resources for personal use and enjoyment. Eligible resources include flowers, berries, pinyon and other nuts, seeds, cones, and other plant parts, campfire wood, rocks, mineral specimens, petrified wood, Christmas trees, semiprecious gemstones, and common invertebrate fossils. Such collection activities are subject to site-specific and other restrictions. Such activity occurs across much of the area, both by visitors and area residents, although detailed information regarding the number of visitors, or the amounts and locations of such activities is not available. Harvesting and collection of berries, nuts and other plants and plant material are important customary and traditional uses of the land to Native Americans. Commercial pinyon nut harvesting also occurs in the Great Basin when an adequate crop occurs. Such harvesting requires a permit and may be subject to competitive bidding.

Travelers passing through the area as part of a multi-part itinerary comprise a large segment of the local tourism industry. Some travelers choose routes through the area based on convenience; for example, there are limited options from northeastern Nevada to Las Vegas. In other cases, travelers follow a deliberate route based on historical, cultural, and other attractions and perhaps in part, in response to state and local tourism promotion efforts, such as following U.S. 50, "The Loneliest Highway in America." Other routes of interest in the region include the Great Basin Scenic Highway, the Great Basin National Heritage Route, Valley of Fire, and Red Rock Canyon Scenic Byways (Clark County), and the Pony Express National Historic Trail across parts of Juab County and northern White Pine County (NDOT 2007a; Benchmark Maps 2006).

Developed historic, natural resource based, and recreation sites in the region include GBNP and 11 state parks and historic sites. Congress established the GBNP in 1986, elevating the status of the former Lehman Caves National Monument, originally designated in 1922 by Presidential proclamation. The GBNP encompasses significant natural and geologic resources, expansive scenic vistas, and dark night skies serving important scientific purposes and providing visitors with opportunities for education, recreation, inspiration, and introspection. In part due to its remote location, GBNP has an active, year-round astronomy program for visitors and scientists. The new Great Basin Visitor Center opened in 2006, more than 5 miles from the historical Lehman Caves Visitor Center, but near the town of Baker and U.S. Highway 6/50, the principal highway through the region. Annual recreation visits to GBNP over the past decade ranged from a low of 69,235 in 2008 to a high of 88,870 in 2010, that latter of which is in line with the

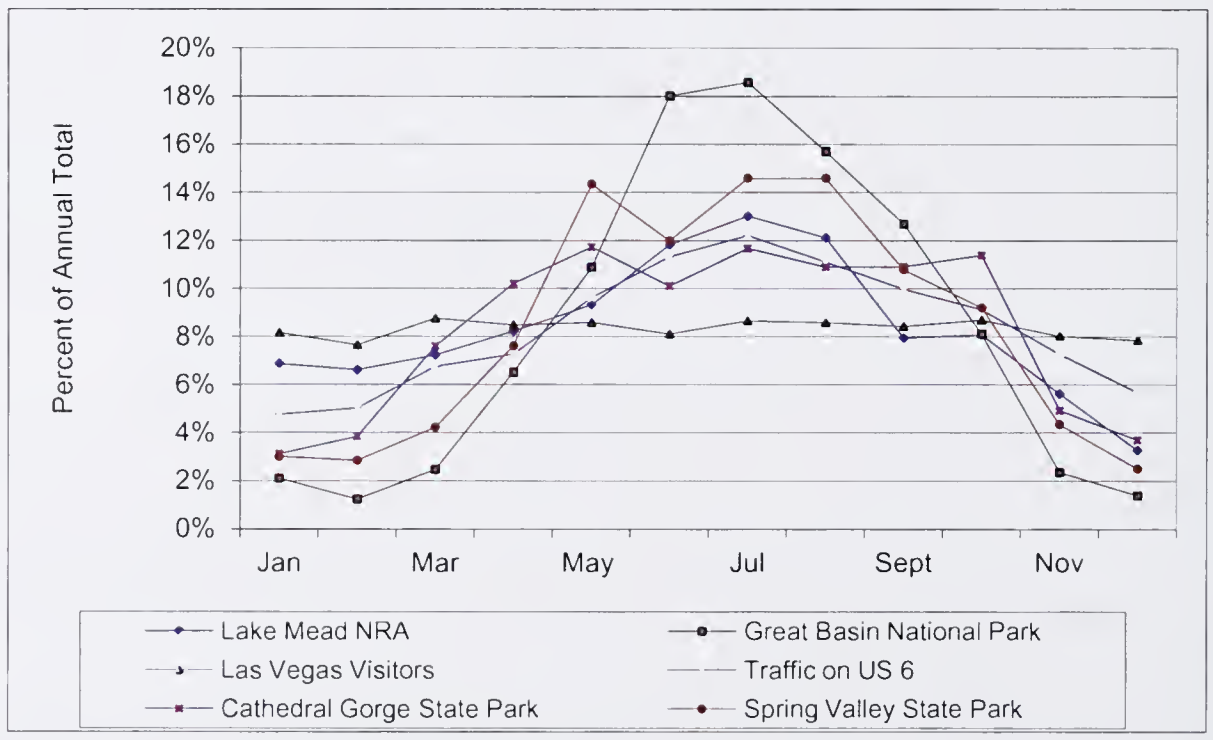
historical average of 80,000 to 90,000 annual visitors (NPS 2011). Visitors to GBNP and NPS employees assigned to GBNP, many of whom are from the Snake Valley, are a vital source of customers for local cafes, recreational vehicles (RV) parks, motels, and other businesses in the Baker area.

In addition to the GBNP, developed recreation areas in the region include eight state parks and historic sites in Lincoln and White Pine counties and three state parks in Clark County. The BLM and USFS have developed numerous recreation sites and areas for dispersed recreation, such as hiking and camping. Wilderness areas in the region provide opportunities for a primitive recreation. The NWRs and conservation areas in the region provide further opportunities for recreation.

The Lake Mead National Recreation Area, managed by the NPS, is located east of Las Vegas, some distance from the southern terminus of the proposed ROW and far removed from the five groundwater development basins associated with the SNWA's groundwater development water applications.

OHV use is an important outdoor recreation activity in the region, although estimates of such use in the study area are not available. Such use is supported by the designation of the Silver State OHV Trail as part of the LCCRDA and subsequent state legislation in Nevada allowing for the operation of OHVs on some public highways in order to reach a private or public area designated for such use. OHV use also is promoted in Utah through cooperative efforts between federal, state, and local governments under the auspices of the Utah Interagency OHV Partners. Residents of the Las Vegas and Salt Lake City metropolitan areas reportedly account for much of the OHV activity in the region, although some sponsored events draw participants from a larger area.

Tourism and recreation occur throughout the year. There is, however, a pronounced summer-fall season in the rural counties (**Figure 3.18-7**). Approximately 65 percent of annual visitation to the GBNP occurs in the 4-month period of June through September. Visitor use at the Lake Mead National Recreation Area, state parks in the area, and traffic on U.S. 6 south of Ely all exhibit seasonal peaking, though it is not as pronounced as at GBNP. Such seasonal fluctuations are in contrast to visitation patterns in Las Vegas, which show a high degree of uniformity over the year.



Sources: NPS 2007; Nevada Division of State Parks 2008; LVCVA 2007a; NDOT 2007b.

Figure 3.18-7 Monthly Visitation or Traffic as A Percent of Total Annual Use or Traffic

The seasonal nature of tourism has implications for local businesses and the jobs they provide. As noted above, a sense of uneasiness and uncertainty exists across the rural counties regarding their economic futures. Tourism and recreation, though much smaller in scale than in Clark County, are viewed as vital elements of the local economies. Many local businesses are economically dependent on tourism and recreation, at least to a degree, whether they cater to all terrain

vehicle enthusiasts, shed hunters (collection of antlers shed by deer and elk), big game hunters, overnight visitors drawn by scenic vistas, solitude and the dark night skies, or part-time residents owning second homes in the region. The purchases of private ranches by non-local corporate and institutional interests, including the SNWA, and future groundwater development are viewed as threatening the region's tourism and recreation industry. Potential threats include limits on historical hunter access, changes in farming and ranching practices that affect wildlife, the potential indirect effects of groundwater drawdown and soil stability in fostering air quality degradation that may affect visibility, night skies, and travel patterns of tourists; all of these could adversely affect the level of tourism and the economic contributions it provides. Tertiary effects of the water rights appropriation process and long-term groundwater drawdown effects on wildlife and tourism are viewed as threatening long-term second home development, which is viewed as another important dimension of economic development in the rural areas. Many of these same effects likely would be viewed by rural residents as threatening important elements of their quality-of-life, because outdoor pursuits, open spaces and scenic vistas as often cited by residents of rural areas for their decisions about where they choose to live.

3.18.1.4 Personal Income and Poverty

Personal income is an important measure of economic well-being. Total annual personal income trends in the study areas reflect key economic and demographic conditions described above. During the 17-year period 1990 to 2007, Clark County registered a 379 percent increase in total personal income, from $15 to $71.6 billion (**Table 3.18-11**). General inflationary trends would account for about 16 percent of the increase and population growth another 38 percent of the change (U.S. Bureau of Economic Analysis 2009; U. S. Bureau of Labor Statistics 2008). The residual reflects general increases that translate into per capita income growth over time. All four rural counties have total personal income substantially below that of Clark County, with totals ranging from $103.9 million in Lincoln County to $338.7 million in White Pine County.

Table 3.18-11 Total Annual Personal Income, 1990 and 2007 ($ Millions)

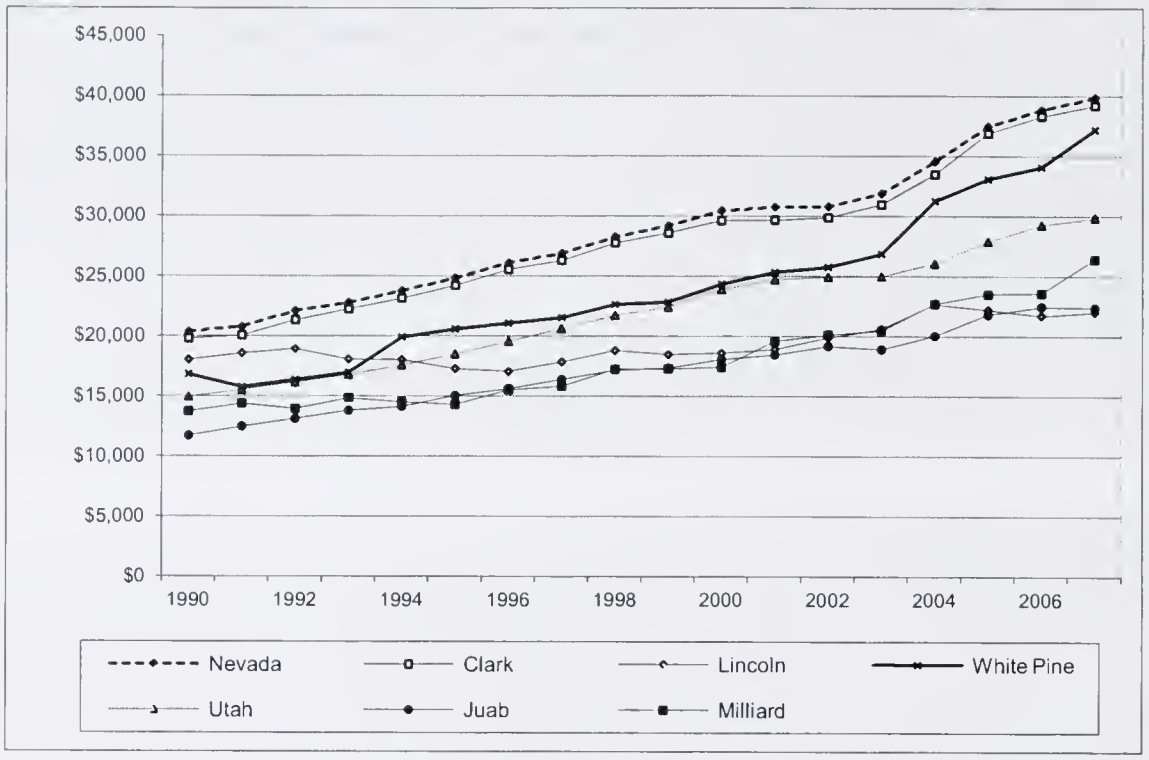
	Nevada	Clark	Lincoln	White Pine	Utah	Juab	Millard
1990	$24,836.8	$14,954.6	$68.6	$157.5	$25,817.3	$68.0	$155.0
2007	$101,799.0	$71,622.4	$103.9	$338.7	$79,617.9	$214.1	$314.1
Changes 1990 to 2007							
Absolute	$76,962.2	$56,667.8	$35.3	$181.2	$53,800.6	$146.1	$159.1
Percent	310%	379%	51%	115%	208%	215%	103%
Population Change	209%	131%	16%	-3%	43%	57%	8%

Source: U.S. Bureau of Economic Analysis 2009.

Net increases in total personal income in White Pine, Juab, and Millard counties were larger than the compounded effects of population change and inflation over the period indicating a net increase in real per capita income of residents. The growth in total personal income in Lincoln County between 1990 and 2007 was 51 percent, lagging the pace of inflation during the period (which was over 60 percent). Net population growth during the same period implies a net decline in real per capita income of local residents over time.

Trends in per capita income, including the lower per capita incomes, comparatively slower growth rates in the rural counties, and general differences in statewide averages between Nevada and Utah are shown in **Figure 3.18-8**. A sharp increase in per capita income is evident in White Pine County, tied to the reopening of the Robinson Mine near Ely in 2004, after a 5-year suspension/shutdown.

Per capita personal incomes in 2007 ranged from $21,988 in Lincoln County to $39,853 in Clark County. Among the 5 counties, only Clark County exceeded the national average of $38,615. The per capita income of $37,176 in White Pine County was 96 percent of the national average. Per capita incomes in the other counties were all less than 70 percent of the national average, with that in Lincoln County of $16,627, trailing by the widest margin (**Table 3.18-12**).



Source: U.S. Bureau of Economic Analysis 2009.

Figure 3.18-8 Changes in Per Capita Income, 1970 to 2007

Table 3.18-12 Comparative Per Capita Income, 2007

	Per Capita Income 2007	Difference Local vs. U.S.	Local As A Percent of U.S.
U.S.	$38,615	$0	100%
NEVADA	$39,853	$1,238	103%
Clark, Nevada	$39,188	$573	101%
Lincoln, Nevada	$21,988	($16,627)	57%
White Pine, Nevada	$37,176	($1,439)	96%
UTAH	$29,831	($8,784)	77%
Juab, Utah	$22,374	($16,241)	58%
Millard, Utah	$26,397	($12,218)	68%

Source: U.S. Bureau of Economic Analysis 2009.

The consistently lower incomes in the rural counties manifest themselves in a higher incidence of poverty and low income as measured by individual or family income relative to a defined threshold. The incidence of poverty ranged from 10.4 percent in Juab County to 16.5 percent in Lincoln County, compared to the national average of 12.4 percent.

3.18.1.5 Housing

An area's housing supply and increases in that supply over time are important indicators of economic and population growth, or lack thereof, as well as being a precursor of potential changes in social conditions. At the time of Census 2000, housing vacancy rates of non-seasonal units in the study area ranged from 7 percent in Clark County to 22 percent in White Pine County. Vacancy rates in White Pine County reflected the economic woes affecting the local mining industry at that time.

Between 2000 and 2007, residential construction in Clark County averaged nearly 33,000 new units per year. Buffeted by the effects of the national recession and sub-prime mortgage crisis, the pace of residential construction in Clark County declined sharply in 2008, although new residential construction continued. Building permits for 2,830 new residential units were issued in Clark County during the 6-month period of January through June 2009, which was approximately 60 percent fewer than for the corresponding period in 2008 and nearly 75 percent below the corresponding period in 2007. Whereas nearly 90 percent of units permitted in 2007 were single-family homes, in 2009, single-family homes accounted for only about half of the total. In terms of location, 49 percent of the new units permitted in 2009, were to be built in unincorporated areas of Clark County, 22 percent in Las Vegas, 20 percent in Henderson, and the remainder in Mesquite and other communities. The net result was a gain of more than 280,000 new housing units being added in Clark County between 2000 and 2010, a net increase of 50 percent and an average of 28,000 new units per year over the decade (**Table 3.18-13**). The 2010 Census recorded an overall housing vacancy rate of 15 percent in Clark County.

Table 3.18-13 Housing Inventory, 2000 and 2010

	Census 2000 Total Housing Units	Census 2010 Total Housing Units	Net Change in Total Housing Units 2000 to 2010	Overall Housing Vacancy Rate 2010
Clark County	559,784	840,343	280,559	15%
Lincoln County	2,178	2,730	552	27%
White Pine County	4,439	4,498	59	18%
Juab County	2,810	3,502	692	12%
Millard County	4,522	4,939	417	15%

Source: U.S. Census Bureau 2011a, 2002.

In contrast to the rapid pace of development in Clark County, new residential development since 2000 has been more modest in Lincoln and White Pine counties. The two counties registered a combined net increase of 611 units, 552 of those in Lincoln County where residential growth was driven primarily by retirees relocating to the area and households with members commuting to jobs in Clark County. The limited scale of new residential development in White Pine County, suggested by the net change in housing units, masks population growth as many incoming households were able to find existing, affordably priced housing. Vacancy rates of 27 percent and 18 percent were reported in the 2010 Census for Lincoln and White Pine counties, respectively. Future residential development is envisioned in southern Lincoln County, primarily in the Coyote Springs and Toquop planned developments, although the pace of any such development hinges on the timing and strength of the economic recovery and other factors that drive real estate markets.

Substantial new residential development occurred in Juab and Millard counties since 2000, with a combined gain of more than 1,100 units. Virtually all of the new construction occurred in the eastern portion of the two counties, far removed from the indirect effects study area. Those areas are generally marketed as affordable alternatives to households economically tied to jobs in the Provo-Orem area. At the time of the 2010 Census, the overall vacancy rates were 12 percent in Juab County and 15 percent in Millard County.

Temporary private lodging, including hotel and motel rooms, guest lodges, and RV sites, are important dimensions of the region's tourism and recreation economy. Such lodging, along with available rental housing, could also support temporary housing needs associated with GWD Project construction. Project-related needs could compete with the traditional uses and markets for those units, including summertime tourists and hunters in the fall, resulting in some displacement during periods of peak demand. The potential for such competition and displacement to occur is particularly acute in Lincoln County and in the Snake Valley, due to limited availability, and in Ely due to the community's efforts to promote its tourism and convention trade. **Table 3.18-14** summarizes the lodging accommodations and number of RV spaces, as well as a qualitative assessment of rental housing availability to meet project needs. Ely hosts the largest concentration of rooms and RV spaces in the rural area where the limited availability contrasts sharply with the more than 148,000 rooms and more than 5,000 RV spaces in Clark County.

Additional RV parking and camping opportunities are available at GBNP, state parks, and at other federally managed developed and dispersed recreation areas in the region. However, these facilities are not included in the above inventory, as they not intended for longer-term use by construction workers.

Table 3.18-14 Lodging and Rental Housing Availability

	Hotels/Motels	Total Rooms	Mobile Home / RV Parks	Total Spaces	Rental Housing Availability
Clark County	300+	148,941	33	> 5,000	Good
Lincoln County	< 10	< 100	< 10	< 100	Limited
White Pine County	25 – 30	700 – 750	10	200 - 250	Limited
Juab County	0 – local 4 – Nephi (100+ miles)	0 – local	0 – local	0 - local	Essentially None
Millard County	1 – local 4 – Delta	29	0 – local	0	Essentially None

Sources: White Pine Chamber of Commerce and White Pine County Tourism and Recreation Board 2007; LVCVA 2010, 2007a,b; Nevada Commission on Tourism 2007; Utah Office of Tourism 2007.

3.18.1.6 Public Facilities and Services and Local Government

The respective county governments are the primary units of local governance and key public service providers in the rural portion of the study area because virtually the entire area is unincorporated. Ely and Caliente are the only two incorporated municipalities in the portions of the four rural counties located near proposed project facilities or within the indirect effects study area. The county governments conduct required statutory and administrative functions for their respective jurisdictional territories, such as public recording, property assessment, law enforcement and public safety, criminal justice and courts, local road and bridge maintenance, and fiscal management. In White Pine and Lincoln counties, the counties also serve as the umbrella administrative organization for the unincorporated towns. There are no incorporated towns located in the western portions of Juab and Millard counties.

A number of special service districts exist in the rural counties, each providing one or more services or functions under the direction of a separate board or commission. Special districts may serve the entire county or a defined service area. **Table 3.18-14** lists the local governments and special districts, along with the functions of the latter, for the rural portions of the study area.

Water providers in the rural areas include municipal utilities in Ely and Caliente, Pioche Public Utilities, Panaca Farmstead Association, Alamo Water and Sewer General Improvement District (GID), Baker Water and Sewer GID, McGill Ruth GID, and Coyote Springs GID. All of these providers rely on groundwater wells for their water supplies and several are facing potential needs to address issues related to water quality standards for arsenic. Households and businesses not served by one of the water utilities rely on cisterns and/or individual wells for potable water and other domestic household needs.

In addition to the county governments in the rural areas, there are 5 municipalities and more than 25 service districts in Clark County. Seven of the service districts, including the SNWA, are water districts engaged in some aspects of water development, treatment, and/or distribution. Only Clark County and the SNWA are listed in **Table 3.18-15** because the service areas for the others are quite distant from the project facilities and ROWs and/or they are unlikely to be directly affected by the project.

Table 3.18-15 Key Local Governments and Special Districts

Local Governments	Special Districts[1]
Clark County, Nevada	Southern Nevada Water Authority
Lincoln County, Nevada City of Caliente Town of Alamo (unincorporated) Town of Panaca (unincorporated) Town of Pioche (unincorporated)	Alamo Sewer and Water GID[2] Coyote Springs GID (water and wastewater) Lincoln County Hospital Lincoln County Regional Transportation Lincoln County Television LCWD Pahranagat Valley Fire Pioche Fire TRI GID
White Pine County, Nevada City of Ely Town of Baker (unincorporated)	Baker Water and Sewer GID McGill Ruth GID White Pine County Hospital White Pine Television White Pine Tourism and Recreation
Juab County, Utah	Juab Special Service Fire District Juab Special Service District #2 (civic infrastructure)
Millard County, Utah	Millard County Fire District

[1] Many of the municipalities and special districts in Clark County could be indirectly affected by changes in future economic and growth scenarios, including those associated with alternative assumptions about water availability. However, detailed assessments of potential impacts on individual municipalities and districts are beyond the scope of the analysis.

[2] GID is an abbreviation for general improvement district, a form of special district that provides one or more types of facilities and services to a defined service area, the service territory of which may include areas in two or more counties.

Sources: Nevada Department of Administration 2007; Utah Office of the State Auditor 2007.

Law enforcement, fire suppression, and emergency medical services are among the more important public services provided to residents, businesses, visitors, and other governmental entities. These services may see project-related demands, principally during construction and also during long-term operations. Staffing levels, response times, and the type and level of service provided mirror the geographic area of coverage, population, and underlying local fiscal resource base of the counties and other providers. **Table 3.18-16** identifies the primary law enforcement agencies serving the study area and the locations and types of emergency medical service providers.

The Nevada Highway Patrol provides coverage throughout the Nevada portion of the study area and the Utah Highway Patrol provides coverage in the Utah portion of the study area. The Nevada Highway Patrol has officers stationed in Mesquite, the Las Vegas Valley, Alamo, and Ely. There are no Utah State Patrol officers based in the Utah portion of the study area; troopers are dispatched from offices in Fillmore when necessary.

The Las Vegas Metro Police department provides law enforcement in the unincorporated areas of Clark County. The respective Sheriff's offices provide coverage in White Pine and Lincoln counties. For the former, deputies are dispatched from Ely. In Lincoln County, deputies are based in Pioche and Alamo. A single deputy, based in Garrison and jointly funded by Juab, Millard, and Beaver counties, serves the Utah portion of the study area.

Community-based acute care hospitals with emergency rooms are located in Caliente and Ely. When care requirements exceed local capabilities, trauma care facilities are located in the Las Vegas Valley or in Salt Lake City, with air ambulance service available to transport accident victims and other critically ill patients. American MedFlight has a fixed-wing air ambulance based in Ely (American MedFlight 2011). There are no hospitals in western Juab or Millard counties. William Bee Ririe Hospital in Ely is the closest facility for most residents of the Snake Valley and Delta Community Medical Center is the nearest hospital in Utah.

Table 3.18-16 Selected Public Service Providers in the Study Area

County	Law Enforcement	Hospitals	Fire Departments	EMS / Ambulance
Clark	Las Vegas Metro Poliee Ncvada Highway Patrol	Las Vegas metro (multiplc), Mesquite	Clark County Firc Department (paid professional in metro area) Rural stations in Moapa Valley (volunteer)	Clark County Firc Dcpartmcnt (paid professional) Private ambulanee Air ambulance
Lincoln	County Sheriff Ncvada Highway Patrol	Caliente	Piochc (voluntcer) Panaca (volunteer) Calicntc (volunteer) Pahranagat Valley [Alamo] (volunteer) Eagle Valley (voluntcer)	Piochc (volunteer) Panaca (volunteer) Caliente (voluntecr) Pahranagat Valley [Alamo] (voluntcer) Eaglc Valley (volunteer) Air ambulance from Las Vcgas
White Pine	County Sheriff Ncvada Highway Patrol	Ely	Ely (eombination) White Pine County Fire District (volunteer) Snake Valley Garrison (volunteer)	Ely (volunteer) Snake Valley [Bakcr] (volunteer) Air ambulance in Ely or from Las Vegas or Elko
Juab	Deputy Sheriff (jointly funded with Millard and Beaver eounties)	Nephi (100+ miles) *Ely is closest*	Callao (volunteer) Granite Ranch (volunteer)	Granite Ranch (volunteer) Air ambulance from Salt Lake City or Provo
Millard	Deputy Sheriff (jointly funded with Juab and Beaver counties)	Delta (80+ miles) *Ely is closest*	EskDale (volunteer) Garrison (volunteer)	Garrison (volunteer) Air ambulance from Salt Lake or Provo

Note: (voluntcer) denotes a volunteer based service.

Sources: Clark County Fire Department 2007; Fire Departments Net 2007; Las Vegas Metropolitan Police Department 2006; Nevada Department of Public Safety (no date); Utah Department of Public Safety 2006; American MedFlight 2011.

The BLM and USFS provide fire suppression on the public lands they manage in the region. Local fire departments provide emergency medical response and fire suppression across most of the rural portions of the study area, often working in concert with law enforcement and local search and rescue teams. All of the rural departments rely on volunteer firefighters and emergency medical technician/paramedics. The fire departments and ambulances are typically community-based but respond to calls in outlying areas of their respective service response territories, most of which are highway accidents. Response times vary but can be lengthy. There is a high degree of cooperation among the providers in an attempt to reduce burdens on volunteers and maintain coverage across the area. For example, an ambulance transporting a patient from the Snake Valley may meet one dispatched from Delta, transfer the patient and allow the former to return.

The Clark County Fire Department covers the rural portion of the county, as well as unincorporated areas in the Las Vegas area. It operates nearly 50 stations, including 4 in northeastern Clark County. Stations in the urban area are staffed by paid professionals while the rural stations in the northeastern portion of the county are volunteer based.

Schools serve important roles in the economic and social structures of rural communities. They provide a sense of community identity, are a focal point for community gatherings, provide jobs, and offer a degree of autonomy. Maintaining local schools in rural areas reduces the time school-age children are in transit, reduces the need to board children in town or to have a parent move into town, and in the case of children from ranch families, allows them to continue traditional ways of helping with chores.

Four school districts serve the rural areas; countywide unified school districts serve White Pine, Lincoln, and Millard counties and the Tintic School District provides public education in western Juab County. Fall enrollments in 2007 ranged from 238 in the Tintic District to 2,852 in the Millard County School District. Many schools in the study area,

including those in the Snake Valley, are small, one- and two-room schools serving multiple grades. The White Pine and Millard school districts cooperate in serving the Snake Valley. Rather than operating separate schools with a single or only a few students in a class, they each operate schools with several grades and allow students living in the other district to attend. **Table 3.18-17** presents summary statistics for the public school districts and identifies the schools, location, and grades taught in or near the study area.

Table 3.18-17 Public School Enrollment, Total Schools and Schools In/Near the Study Area

School District	Total Enrollment Fall 2007	Number of Public Schools in District	Schools In/Near The Study Area School Name (Location and Grades)
White Pine County	1,443	8	Baker Elementary (Baker 3-6) [School operates under a cooperative program with Millard County]
Lincoln County	953	9	Caliente Elementary (Caliente K-6) Panaca Elementary (Panaca K-6) Pioche Elementary (Pioche K-6) Bastian (Caliente 6-12) Meadow Valley Middle (Panaca 7-8) Pahranagat Valley Middle (Alamo 6-8) Lincoln County High (Panaca 9-12) Pahranagat Valley High (Alamo 9-12)
Tintic (Juab County)	238	5	Callao School (Callao K-8) West Desert Elementary (Partoun/Trout Creek K-6) West Desert High (Partoun/Trout Creek 7-12)
Millard County	2,852	11	Garrison Elementary (Garrison K-2) Garrison Secondary (EskDale 7-8) EskDale High (EskDale 9-12) [These schools operate under a cooperative program with White Pine County]
Clark County	308,783	349	None in area potentially affected by production-related drawdowns

Sources: Nevada Department of Education 2007, 2006; Utah State Office of Education 2007a,b.

The Clark County School District is the largest in the state in terms of enrollment. Fall enrollment in 2007 was 308,783 students in 349 public schools. Nearly 16,000 additional students enrolled in private schools. The total is nearly 33 percent above the 231,765 students enrolled in public and private schools in the fall of 2000, and another indication of the recent population growth in the Las Vegas Valley. Ninety-nine new public schools have opened since 2000 to accommodate the growth. There are no public schools located near any of the proposed facilities.

The county governments in the study area rely heavily on ad valorem tax revenues, commonly referred to as property taxes, to support public services and facilities. Although assessment practices differ in Nevada and Utah, the resulting taxable valuations[7] are indicative of the underlying tax bases for the respective counties. Total taxable valuations for recent years, for each county, are shown in **Table 3.18-18**. Countywide assessed valuations in 2009-10 ranged from $194.8 million in Lincoln County to $93.9 billion in Clark County. The assessed valuation of $1.8 billion for Millard County is bolstered by the valuation on the Intermountain Power Plant located near Delta. The $382.3 million valuation for White Pine County included $185.6 million in net proceeds of mining assessment, primarily on production from the Quadra Mining Robinson Mine near Ely (Nevada Department of Taxation 2010; Utah State Tax Commission 2010). Net proceeds of mining can vary dramatically year-to-year due to changes in production rates, allowable deductions

[7] The terms "taxable value" (Utah) and "assessed valuation" (Nevada), are generally equivalent to each other, referring to the base value to which the tax rate is applied. Taxable value represents the estimated market value of property, multiplied by the applicable assessment ratio for a particular class of property.

and market prices. Taxable valuations on residential and commercial real property were traditionally viewed as being relatively stable or climbing over time in response to new development and real estate appreciation. As such, ad valorem taxes provided a foundation for general government operations and long-term debt service. Effects of the recent recession, many of which persist, included lower property values, particularly in Clark County. As a result, the ad valorem tax base for Clark County fell by more than 45 percent in 2 years. The other four counties in the study area also saw declines in their tax base, but of a substantially smaller scale.

Table 3.18-18 County Ad Valorem Tax Valuations, 2003-2004 to 2010-2011 (Millions)

Tax Year	Clark County	Lincoln County	White Pine County	Juab County	Millard County
2003 – 2004	$ 45,903.4	$ 112.8	$ 126.3	$ 456.8	$ 1,887.9
2004 – 2005	$ 51,566.6	$ 97.2	$ 115.6	$ 541.0	$ 1,833.9
2005 – 2006	$ 68,132.6	$ 111.1	$ 171.4	$ 632.0	$ 1,811.5
2006 – 2007	$ 94,658.2	$ 163.8	$ 410.1	$ 675.3	$ 1,833.6
2007 – 2008	$ 110,310.2	$ 181.3	$ 404.9	$ 737.1	$ 1,890.2
2008 – 2009	$ 118,805.5	$ 190.0	$ 370/8	$ 759.3	$ 1,943.3
2009 – 2010	$ 93,874.5	$ 212.8	$ 382.3	$ 711.3	$ 1,801.0
2010 - 2011	$ 63,926.3	$ 194.8	$ 373.4	N/A	N/A

N/A = Not available.

Sources: Nevada Department of Taxation 2010; Utah State Tax Commission 2010.

Property taxes levied on the local tax bases go to support the general funds of the counties. Other taxing jurisdictions, including school districts, municipalities, and service districts, also may realize revenues from levies imposed on the assessed valuation within their respective service areas (though not all service providers impose property taxes). Under Nevada statutes, SNWA is not authorized to levy an ad valorem tax. SNWA is funded by a combination of operating and non-operating revenues, the former derived primarily from wholesale water delivery charges to its purveyor members. SNWA's major non-operating revenue sources include connection charges, proceeds from a 0.25-cent sales tax on taxable sales in Clark County, funding made available under the provisions of the Southern Nevada Public Lands Management Act, regional commodity and reliability charges, and miscellaneous other charges (SNWA 2011).[8]

Intergovernmental revenues, including distributions of state-shared revenues, and other taxes, licenses, fees, and earnings also support the county general funds. Intergovernmental transfers also include federal payment in lieu of taxes (PILT), which are generally based on the amount of federal lands located with a county. The rural counties generally realize a higher share of their total revenues from property taxes than does Clark County. Clark, Juab, and Millard counties each realize more than 45 percent of their general fund revenues from other sources. In the case of Clark County, the diversity reflects both the options and perhaps necessities of tapping into additional revenues to address the needs in a large metropolitan area during periods of rapid growth. Lincoln and White Pine counties are more dependent on intergovernmental transfers than are the other three counties. In the case of Juab and Millard counties, the increased use of other revenues, at least in comparison to White Pine and Lincoln counties, reflects many factors including underlying differences in local government finance between the states.

In recent years, a substantial portion of the receipts underpinning the state-shared revenues in Nevada were derived from taxes and fees associated with new residential and commercial construction in Clark County and from gaming revenues. The state's tax structure is heavily reliant on gaming and sales and use taxes, the latter including those generated by new construction. Prior to the recession, those three sources together typically accounted for 75 to 80 percent of the state's general fund revenues, and are important to funding local government and education. The reliance on these revenues is a legacy of tax reforms in the 1980s and the integration of tax law into the state's constitution. An implication of the latter is that it imposes a "very purposeful inflexibility" on Nevada's tax structure (Nevada

[8] Additional information regarding SNWA's financial structure and condition can be found on SNWA's internet site: http://www.snwa.com/html/about_index.html.

BLM 2007

Governor's Task Force 2002). The declines in revenues from those three sources accompanied the slowdown in new development and decreased tourism visitation in the wake of the national economic recession have contributed to budgetary pressures on the state and local governments and public education across the state.

The purchases of private ranches by the SNWA and the prospects of the development and transbasin diversion of groundwater have raised fiscal concerns for some of the local governments in the rural areas. The concerns include:

- The removal of the real property from local tax rolls and reduction in sales tax receipts related to farm operations due to SNWA's tax exempt status,
- Potential indirect adverse effects on local businesses operating revenues and taxes if SNWA uses its institutional procurement programs to buy supplies outside the region that historically had been purchased locally, and
- The potential effects of transbasin diversions in constraining local economic development, the loss of future public sector fiscal support associated with foregone development, and the effect of SNWA's groundwater development project in increasing the costs to develop remaining waters reserved by the State Engineer for local needs.

To address the first of these concerns, the SNWA and White Pine County have an agreement under which the SNWA will make "in lieu of tax" payments to offset some of the tax revenue reductions. The latter two issues are more difficult to address. The former involves trade-offs between the SNWA's interests in managing costs for its purveyor members and what some see as a modest marginal cost to the SNWA to provide fiscal support for local governments that may be adversely affected by the project, particularly given the overall project costs and benefits to accrue to the Las Vegas Valley. The latter also involves trade-offs between SNWA's right to pursue cost-efficient development of public water appropriated to it by the State Engineer and the general public interest in maintaining economically and socially viable rural communities.

3.18.1.7 Social Organization and Conditions

This section describes relevant social conditions in the geographic area potentially affected by the Proposed Action and alternatives. The focus of this section is on the areas containing and surrounding the ROWs and proposed groundwater development areas, although social conditions in the Las Vegas Valley pertaining to the groundwater development project are also discussed. Information for this section was obtained from the Ely RMP/Final EIS (BLM 2007), review of the EIS scoping record, NSE hearing exhibits, attendance at and summaries of public meetings, newspaper and magazine articles and editorials concerning the proposed project, and from other secondary sources and personal interviews. Individuals interviewed as part of this assessment included local elected and appointed officials and staff, economic development officials, ranchers, business owners and managers, and others. Additional information on the historical context for settlement and development in the study area "communities of place,"[9] current social trends, affected populations and interest groups, attitudes and opinions within the socioeconomic study area and the ongoing social effects of the proposed project can be found in **Appendix F3.18**.

From a social standpoint, "communities" include not only settlements, towns and cities, but also the social linkages associated with economic activities (e.g., ranching, tourism, and recreation services) as well as social institutions (e.g., local governments, schools and churches) and settings that provide forums for social interaction and community dialogue regarding important issues. In many instances, social and economic effects of various actions and policies that occur across the landscape in outlying rural areas manifest themselves in local communities. Communities in Clark, White Pine, and Lincoln counties in Nevada and Millard and Juab counties in Utah may be indirectly affected economically and socially by the Proposed Action and alternatives.

The following communities in the rural portion of the study area are most likely to experience measurable short-term social and economic effects related to construction or long-term effects associated with groundwater drawdown: Ely and Baker in White Pine County, Caliente; Pioche, Panaca, and Alamo in Lincoln County; and Garrison and EskDale in Millard County. Baker, Garrison, EskDale and the settlements of Callao, Trout Creek, and Partoun (all located in Juab County) collectively comprise the area commonly referred to as the "Snake Valley" community. Other communities that are more removed from the project, for instance, McGill and Ruth near Ely, could experience some

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[9] A place where people live, work, or otherwise routinely interact.

"spillover effects" during peak construction activity or when construction demand coincides with other demands, such as fall hunting. Some of the indirect social and economic effects of the proposed project would also manifest themselves in the Las Vegas Valley. Much of the material, construction support services, and construction labor for the pipeline and ancillary facilities would come from the Las Vegas Valley. According to SNWA's projections, expansion of Las Vegas Valley's water supply is necessary to support long-term growth and development in the Las Vegas Valley. However, as evidenced by real estate and economic development conditions during the recent recession, water availability, in and of itself, is not an underlying cause of growth, although lack of water can be a constraint to growth.

Brief descriptions of each of these communities follow.

Ely. Ely is the White Pine County seat and largest community in the rural portion of the study area (2010 population of 4,255). Ely is a regional commercial and service center for the ranching and mining communities in east central Nevada and provides essential medical, emergency, law enforcement, retail, and hospitality services to residents and travelers alike. The two largest employers in the region are the Robinson Mine, employing approximately 600, and the Ely State Prison, a maximum security facility employing approximately 400 workers. The Robinson Mine has a remaining mine life of approximately 7-to-10 years, which contributes to a keen local awareness of the need for economic development and diversification. A number of other mining projects are active in the area. McGill and Ruth, two unincorporated, primarily residential communities near Ely, share Ely's history of mining, but project-related effects would likely be limited to hosting a small number of construction workers.

The Ely Reservation. The Ely Reservation is the tribal reservation for the Ely Shoshone tribe. The reservation consists of 3 separate parcels, totaling approximately 111 acres, within and near the city of Ely. About half of the estimated 500 members of the tribe reside on the reservation. More than 60 residences for tribal members are located on these lands, as are the tribe's administrative and housing offices, a preschool, clinic, and community center. Under provisions of the White Pine County Conservation, Recreation and Development Act of 2006, 4 parcels of federal land, totaling 3,526 acres, were conveyed to the tribe. Two of the parcels are in the vicinity of Ely, another is north of McGill, and the largest is west of Ely. The largest of these parcels is restricted for traditional ceremonial purposes, but the other parcels could be used to promote industrial, commercial, and residential development to help provide economic support for the tribe and jobs for some of its members.

Confederated Tribes of the Goshute Indian Reservation. The reservation encompasses nearly 113,000 acres in northeastern White Pine County, Nevada, and neighboring Tooele and Juab counties in Utah. The confederated tribes of the Goshute include the Goshute (a Shoshonean people), Paiute and Bannock peoples. Following contact with settlers and Mormon missionaries, the Goshute became active in farming and ranching. The Tribal Center is located in the community of Ibapah, Utah, approximately 65 miles (linear) northeast of Ely but many of the tribal members reside on farms and ranches dispersed across the reservation (Confederated Tribes of the Goshute 2010).

Snake Valley (Nevada and Utah). The Snake Valley straddles the Nevada - Utah border, includes portions of White Pine County in Nevada and Millard and Juab counties in Utah, and is remote and distant from large population centers. Snake Valley encompasses the town of Baker, Nevada, the Utah communities of Garrison and EskDale, and Gandy, Partoun, Trout Creek, and Callao settlements located in the valley. These are the only communities within an affected hydrographic basin and Snake Valley and Spring Valley are the only permanently inhabited hydrographic basins associated with the Proposed Action. Although separated by considerable distances over unpaved roads and nominally divided by state and county boundaries, Snake Valley residents consider themselves a single community in some respects. Ranching, grazing, and associated cultivation of hay and other feed crops have been the traditional agricultural activity in Snake Valley. Snake Valley sits at the center of the Great Basin National Heritage Area, comprised of Millard County, Utah, and White Pine County, Nevada, designated by Congress in 2006.

The Baker community consists of residences, an elementary school, post office, convenience stores, several motels and campgrounds, other community facilities, including a new non-denominational church. Baker and the nearby Great Basin Visitor Center serve as the gateway to the main access into GBNP. It is also home to the Home Farm, a small farm/retreat center that is the base for the School of the Natural Order, a spiritual community following the teachings of Vitvan (www.sno.org) founded the late 1950s.

Garrison is approximately 8 miles southeast of Baker. Found in the mid-1850s, the town traces its history to agriculture and mining. In addition to residences, the town hosts an elementary school, post office, and a Utah Department of Transportation road maintenance facility.

EskDale is located in western Millard County, north of US 6/50, approximately 10 miles northeast of Baker. EskDale, a functioning religious community founded in 1955, currently has approximately 60 residents supported primarily by agricultural operations including a diary. EskDale High School provides public education for high school students from EskDale, Baker, Garrison, and nearby areas under a cooperative arrangement between the Millard and White Pine school districts.

Early visitors to Lehman Caves began a tradition of tourism and recreation use of the area that has since been bolstered by the designation of nearby GBNP and designation of a segment of U.S. 6/50 through Millard and White Pine counties as the Great Basin National Heritage Route. Many residents of neighboring Spring Valley, to the west of the mountains in between the two valleys, have social ties to Snake Valley through churches, schools, and civic and other organizations.

Spring Valley, Nevada. Spring Valley is located west of Snake Valley between the Schell Creek and Snake mountain ranges. There are no towns or government facilities in Spring Valley and the sole retail business is an RV park/convenience store and bar located on the west side of the valley along U.S. 6 and 50. As noted above, Spring Valley residents, primarily ranchers, and ranch employees, have social linkages to Snake Valley and Ely. Children of Spring Valley residents attend school in Snake Valley or Ely, or in some cases, are home schooled.

There is a history of agricultural land consolidation in Spring Valley; most of the existing ranches in the valley are assemblages of parcels from prior homesteads. Recently, SNWA acquired a number of ranches in the southern and central portions of the valley. The purchase by SNWA of ranches in Spring Valley has accelerated social change in the valley. Some ranchers and ranch employees have left the area, some remain in retirement, while others remain to manage or lease SNWA-owned ranches. More recently, a wind energy project has been developed to take advantage of the meteorological conditions in northern Spring Valley.

Caliente. Caliente is the only incorporated town in Lincoln County and is centrally situated in the county in a north-south context. U.S. 93 runs through the town, linking Caliente with Panaca, Pioche, and Ely to the north and Alamo and the Las Vegas Valley to the south. Initially a ranching center, Caliente became a railroad town during the early 1900's. The Union Pacific mainline still operates in Caliente, linking Salt Lake City, Las Vegas, and Los Angeles. Tourism, state and local government services, and commercial trade comprise other elements of the town's economic base and factor heavily in the community's social structure. Geothermal hot springs in the town have long been an attraction for residents and travelers. Caliente may eventually develop the strongest intra-county links to the Toquop energy project and planned unit developments in southern Lincoln County due to the existing road corridor provided by Nevada 317 and county roads.

Panaca. The unincorporated town of Panaca was founded in the 1860's as an agricultural community by members of the LDS Church. Panaca is said to be the oldest surviving town in Nevada (Lincoln County Chamber of Commerce 2007). Agriculture plays a central role in the community, anchored by several large ranches. The town has a small but active commercial sector. Travel/tourism are important in the local economy, as the town is situated at the intersection of two major highways linking Panaca to Cedar City, St. George, and the I-15 corridor in Utah. Like Caliente, Panaca benefits from being centrally located in a cluster of six state parks, one of which, Cathedral Gorge, is located just north of town.

Pioche. The unincorporated town of Pioche is the Lincoln County seat. It was a mining center and the largest town in Southern Nevada during the early 1870's, with a population of 10,000 (Lincoln County Chamber of Commerce 2007). Currently, the economic mainstays in Pioche are county and state government, travel/tourism, and commerce supported by the local farming and ranching community. Outdoor enthusiasts, including big game hunters, OHV users, campers, mountain bikers, and others traveling to the nearby Echo Canyon and Spring Valley state parks and other public recreational use areas administered by the BLM and USFS also support local commerce.

Alamo/Pahranagat Valley. The unincorporated town of Alamo is about 100 miles north of Las Vegas on U.S. 93 and is 54 miles southwest of Caliente. Alamo is the business and social center of the Pahranagat Valley, which also houses

the settlements of Ash Springs and Hiko. In addition to ranching, economic activities in the Pahranagat Valley include tourism/recreation/travel oriented business as serving highway travelers and visitors to the Pahranagat NWR, nearby ghost towns, and Native American petroglyphs. Local government and education play important roles in the local economy. While serving local needs, U.S. 93 is an important major north-south commercial trucking corridor and an important route for tourists traveling to/from Las Vegas, underscoring the importance of the highway network to supporting the gaming and hospitality industry. Alamo is the nearest community to the Coyote Springs development on the Clark County/Lincoln county line.

Coyote Springs. Coyote Springs is a master-planned community located in Clark and Lincoln County east of the junction of U.S. 93 and Nevada 168 and northwest of the community of Moapa and the Moapa Indian Reservation. The Coyote Springs master plan includes multiple golf courses, a range of housing options, and retail and other commercial development. At full build out, which was envisioned to occur over the next half-century, Coyote Springs could have upwards of 200,000 residents (Las Vegas Review Journal 2007). Development of the initial phases of water and wastewater utility systems, a championship golf course, and the first model homes have been completed. The recent economic recession and collapse of the market for new residential and commercial development prompted the project's master developer of Coyote Springs to position approximately 9,000 acres as a renewable energy center to take advantage of transmission line capacity and proximity to markets. To date, a lease agreement has been completed with BrightSource Energy and marketing of sites for additional projects continues (Coyote Springs Land Company 2009; BrightSource Energy 2009).

Las Vegas Valley. Clark County encompasses approximately 8,091 square miles of land area. The majority of the county's existing development and resident population are located in the Las Vegas Valley, a major metropolitan area encompassing the cities of Las Vegas, North Las Vegas, Henderson, nearby Nellis AFB, and master planned communities and urban scale development in unincorporated areas. The Las Vegas Valley is an evolving, dynamic, full-service and diversified metropolitan area, adding 1.2 million new residents between 1990 and 2010. From the perspective of many residents community leaders and outside observers, the Las Vegas Valley is unique in a way that is fundamental to the community's self and external images. The Las Vegas Valley has been characterized as "the manifestation of American capitalism," "a city of economic opportunity and dreams," "having a much higher risk tolerance than is common across America", and "a city where what other cities would see as constraints are viewed as challenges." The area's achievements in addressing challenges over time have become a source of civic pride and a general feeling of "having arrived", as is echoed on by the banner "World Class City....Global Appeal" on the cover of the 2007 Las Vegas Perspective (Metropolitan Research Association 2007).

Another dimension of the Las Vegas Valley as a community of place is captured in the oft-noted refrain, "as goes [Clark County/Las Vegas/the Valley], so goes Nevada." Although not all residents would see the relationship as positive, informed observers describe it as a fundamental recognition of Nevada's economic and fiscal realities. The Las Vegas Valley is home to more than 70 percent of Nevada's residents and accounts for an even larger share of the state's economic activity. Consequently, the reality of reduced rates of growth or stagnant or declining levels of tourism visitation triggers fiscal concern with statewide reverberations. From the Las Vegas Valley perspective, these fiscal linkages provide the basis for why Nevadans outside the valley have a stake in the health of the local economy (Nevada Governor's Task Force 2002).

Las Vegas Paiute Colony and Reservation. Home to the Las Vegas Tribe of Paiute Indians, the colony initially consisted of 10 acres of land near downtown Las Vegas deeded to the tribe by ranch owner Helen Stewart. In 1983, an act of Congress returned 3,800 acres to Paiute possession in an area known as the Snow Mountain Reservation. That land is located on the northwest outskirts of the Las Vegas metropolitan area. A portion of the Snow Mountain Reservation land is now the Las Vegas Paiute Golf Resort. Tribal enterprises provide the Tribe with a source of employment and an independent source of revenues to support Tribal operations and other economic development endeavors.

Northeastern Clark County. A segment of the proposed project ROW, along with the treatment and main water storage facilities, would be located in northeastern Clark County, outside the immediate Las Vegas Valley. The immediate area around the location of these facilities is largely undeveloped. Nearby development includes the APEX industrial complex, zoned for light and heavy industry, located to the west and southwest of the proposed ROW and ancillary facility locations and a major BLM multiple-use transmission corridor located south of the proposed ROW.

The Silverhawk natural-gas fired power plant is located in the APEX complex. Other nearby development includes a portion of the Nellis AFB flight range located northwest of the proposed ROW.

The City of Mesquite and nearby unincorporated communities of Bunkerville, Logandale, Glendale, Overton, Moapa, and the Moapa Indian Reservation, with a combined population of approximately 30,000 residents, are located in northeastern Clark County, which is more distant from the project ROW. Mesquite is a growing retirement and destination resort community, 80 miles from Las Vegas, near the Nevada-Utah state line, and bordering more than 13,000 acres of lands disposed of by the BLM pursuant to the Lincoln County Land Act of 2000 and the LLCRDA. The land is slated for mixed residential, commercial, and resort development. Nearby the Valley of the Fire State Park and Lake Mead National Recreation Area also are important elements of the local economies.

Moapa River Indian Reservation. Home to the Moapa Band of Paiute Indians, the reservation encompasses approximately 72,000 acres straddling I-15 in northeastern Clark County. The Moapa Band of Paiutes offers a wide range of social, housing, cultural, education and health care programs in addition to Tribal administration, law enforcement, and court functions. A small portion of the Tribal lands is utilized for farming. The principal economic enterprise for the Tribe is the Moapa Paiute Travel Plaza located at exit 75 on I-15 (Moapa Band of Paiutes 2010). There are about 300 enrolled Tribal members, approximately two-thirds of whom live on the reservation, along with about 250 non-members.

Populations and interest groups who may be affected by the Proposed Action and alternatives include not only the residents of the communities listed above but also people who reside outside the study area but have a connection to the area due to economic interest, resource use, familial ties, land ownership, prior residency or more general public policy or environmental concerns. The interests of Native Americans, particularly as they pertain to historic use of the area and traditional values, are addressed in Section 3.17, Native American Traditional Values, of this EIS.

In addition to Native Americans, affected populations generally include the following:

- Ranchers, farmers, and grazing permittees operating within the study area;
- Current, former, and prospective residents of the study area, including those who place a high value on scenic, environmental, recreational, and social amenities;
- Individuals and groups who give a high priority to resource protection;
- Outdoor recreation users with interest in the study area;
- Tourism and outdoor recreation oriented businesses within the rural portion of the study area;
- Other businesses and economic development interests within the rural portion of the study area;
- Residents of the Las Vegas Valley concerned about future availability of water;
- Las Vegas Valley residents concerned about the public cost of the water importation project and the effects of growth that could be enabled by additional water supplies;
- Businesses and economic development interests within the Las Vegas Valley; and
- Utah residents and communities, including those on along the Wasatch Range, concerned about the allocation of Snake Valley water among the states and effects on air quality and other environmental resources.

Note that individuals may be associated with more than one group. For example, some ranchers may also place high value on scenic, environmental, recreational, and social amenities and may also be outdoor recreationists.

Water plays a critical role in the social and economic development of the region. Consequently, events and actions related to water attract public attention and scrutiny, becoming focal points for discourse and debate, both informally among individuals and in more public and formal settings, such as "letters to the editor" in local newspapers, testimony given during NSE water right application hearings and discussions in local county commission proceedings. In this instance, the prior filings of water rights applications, the implications of those filings on regional water development, use and economic development, and SNWA's property acquisitions in the region have given rise to well-formed

attitudes and opinions regarding the proposed project that are integral to existing baseline social conditions. The attitudes and opinions regarding the proposed project are complex and vary in specifics across locales and interests and among organizations, groups, and individuals. However, certain general attitudes and opinions tend to be associated with the rural portions of the study area and others with the Las Vegas Valley. Additional discussion of attitudes and opinions in both portions of the study area can be found in **Appendix F3.18**.

Social conditions in the assessment area have already been substantially affected by both the proposed project and the SNWA water rights applications in Lincoln and White Pine counties. Current effects of the proposed project provide insights into potential effects of implementation of the Proposed Action and Alternatives. The following summarizes some of the current social effects described in the Socioeconomic Technical Report of **Appendix F3.18** and drawn from public oral and written comments on the Draft EIS presented at the public hearings and submitted to the BLM.

1. Social effects of proposed groundwater exportation began with the 1989 LCWD water rights filings in Lincoln, White Pine, and other rural Nevada counties. Subsequent events, including SNWA's active efforts to pursue these water right applications, passage of the LCCRDA, initiation of this EIS, the NSE's earlier rulings granting water rights in Spring, Delamar, Dry Lake, and Cave valleys to SNWA, and the issuance of the draft Utah/Nevada Agreement for Management of the Snake Valley Groundwater System, have signaled to some affected parties that the proposed project was moving forward. The January 2010 court rulings on the water rights applications and subsequent suspension of negotiations on the Utah/Nevada agreement by the governor of Utah have signaled to some that the GWD Project may be at risk, or potentially scaled back in scope, should insufficient water rights be appropriated to support the project. These signal events have helped shape the attitudes and opinions of the affected parties. In March 2012, rulings by the NSE on the Spring, Delamar, Dry Lake, and Cave applications awarding a total of up to 83,988 acre-feet of water annually to SNWA, were met with harsh criticism by opponents of the proposed GWD Project.

2. Divergent attitudes and opinions in the rural areas and in the Las Vegas Valley are based on the affected parties' perceptions of risk associated with the project. For many residents of the affected rural areas, which include southwestern Millard County and a portion of extreme western Beaver County in Utah as well as Lincoln and White Pine counties in Nevada, the perceived risks include adverse effects on the physical and biological environment and to the quality of life, health, and livelihood of current residents and their progeny. Among some residents and commercial and development interests in the Las Vegas Valley, perceived risks include an inadequate supply of water to support economic recovery and growth and serve as a buffer against the diminishing supply of Colorado River water under persistent or severe drought in the Colorado River system.

3. Substantial disagreement exists among various hydrogeologists regarding the extent of drawdown associated with the groundwater development project and the effect on surface waters (see Section 3.3, Water Resources) and about the reversibility or ability to mitigate higher than acceptable levels of groundwater depletion in the hydrologic basins. Such divergent expert opinions emerged in the NSE hearings for the SNWA water rights applications in the affected hydrologic basins, through newspaper, magazine and journal articles, on websites, and in publications of various advocacy groups with an interest in the project (see Section 3.3, Water Resources).

4. In the rural portions of the socioeconomic assessment area, the divergent opinions, and uncertainties serve to reinforce existing beliefs regarding the lack of available "surplus" groundwater, derived in part through local experience with groundwater depletion associated with agricultural use. Local beliefs regarding potential adverse effects of water exportation are also traced to the Owens Valley experience in California, despite the differences between that example and the proposed SNWA groundwater development project.

5. For many residents of the rural part of the assessment area, the uncertainty, divergent expert opinion and strongly held local beliefs about water resources have led to the position that the proposed project presents an unacceptable risk to their quality of life, health, and livelihood for themselves, their children, and future generations. For some, particularly the residents of the Snake and Spring valleys, which are the only appreciably inhabited hydrogeographic basins and to ranching and grazing interests within and adjacent to the other three hydrogeographic basins, offsetting benefits have yet to emerge that would make these risks acceptable.

6. For some people, commercial interests, and governmental entities in the Las Vegas Valley, including those that view the risk of water shortages and curtailed growth as unacceptable, the proposed project represents the most

practical and viable option to provide an additional safeguard against future Colorado River water shortages and to support economic recovery and growth.

7. Social effects of the proposed project to date include political conflict, social dissension, community discord, and personal distress. Political conflict and social dissension have occurred at the interstate level between Nevada and Utah, at the intrastate level between various interest groups, between the rural counties and SNWA/Las Vegas Valley, and at intra-community level, between groups and individuals within the rural counties in Nevada and within the Las Vegas Valley. Community discord has occurred within both Lincoln and White Pine counties between groups and individuals supporting unyielding opposition to the proposed project and those believing that implementation of the project is inevitable and a negotiated settlement with SNWA would be more beneficial. Within Clark County, community discord has occurred between groups and individuals that support continued growth and those that oppose growth at recent levels and the perceived detrimental environmental and social effects of such growth. The potential cost of the proposed project and associated effects of those costs on ratepayers and taxpayers has also been a source of concern within the Las Vegas Valley, and the subject was also cited by other stakeholder interests in testimony presented to the NSE's recent hearings and in comment response to the Draft EIS.

8. The proposed project has generated substantial levels of personal distress in the rural parts of the assessment area, as evidenced by scoping comments, statements at public meetings, letters to the editor in local news media, comments on internet sites, and personal interviews. Evidence of personal distress in the Las Vegas Valley has been less prevalent but has emerged in some of the same venues around concern for water availability, as well as concern for the effects of continued high levels of growth.

9. Over the years, the social effects of potential transbasin diversion of groundwater include the formation of advocacy organizations, local government committees, and regional authorities. Among the more tangible effects to date of the proposed project on the social context of the rural part of the assessment area are SNWA's purchase of seven ranches in Spring Valley and the subsequent relocation of some of the ranching families whose properties were acquired. Residents of Snake Valley also cite the inability to obtain commercial water rights due to the SNWA water filings as a dampening effect on growth and development in the valley.

3.18.1.8 Environmental Justice

Overview

Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (CEQ 1997). EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, tasks "each federal agency [to] make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations." The memorandum accompanying EO 12898 identifies four important ways to consider environmental justice under NEPA.

a) "Each federal agency should analyze the environmental effects, including human health, economic, and social effects of federal actions, including effects on minority populations, low-income populations, and Indian tribes, when such analysis is required by the NEPA.

b) Mitigation measures identified as part of a NEPA assessment or a ROD, should address, whenever feasible, significant and adverse environmental effects of proposed federal actions on minority populations, low-income populations, and Indian tribes.

c) Each federal agency must provide opportunities for effective community participation in the NEPA process, including identifying potential effects and mitigation in consultation with affected communities and improving the accessibility of public meetings, crucial documents, and notices.

d) Review of NEPA compliance (such as USEPA's review under Section 309 of the Clean Air Act) must ensure that the lead agency preparing NEPA analyses has appropriately analyzed environmental effects on minority

populations, low-income populations, or Indian tribes, including human health, social, and economic effects" (CEQ 1997).

The minority and low-income status of populations within the socioeconomic study area are described in the following section. It also discusses potentially affected Indian Tribes and directs the reader to sections of the EIS describing the BLM's community and Native American participation initiatives. The analyses of potential environmental justice effects of the Proposed Action and alternatives are included in the Environmental Consequences section as are mitigation measures for potential effects on minority and low-income populations and Indian Tribes.

Minority, American Indian, and Low Income Populations

Table 3.18-19 provides information comparing the percentages of racial and ethnic minorities residing in the socioeconomic study area, as reported by the 2010 Census, to the percentages of racial and ethnic minorities in Nevada, Utah, and the U.S. as a whole.[10] The prevalence of racial and ethnic minorities in each of the four rural counties was substantially lower than that of their respective states. At 52.0 percent, the percentage of racial and ethnic minorities in Clark County was higher than Nevada as a whole (45.9 percent). Most of the minority population resides in the Las Vegas Valley, which is some distance from the sparsely populated portion of Clark County within the proposed pipeline corridor and associated groundwater development basins, although the western boundary of the Moapa Indian Reservation lies several miles east/northeast of the southern terminus of the pipeline and water treatment facility.

As compared to their respective states, ethnic and racial minority residents account for substantial shares of the populations in Juab, Millard, and Lincoln counties. The American Indian and Alaskan Native population in White Pine County was 5.5 percent of total population (549 persons) as compared to the Nevada statewide average of 2.1 percent. Most of the American Indian population in White Pine County resided in the Ely Colony near the City of Ely.

No tribally owned lands or mineral resources or lands or minerals held in trust for Indian Tribes by the federal government are located within or near the pipeline corridor or within the Native American Traditional Values analysis area considered for this assessment. The traditional territory and areas of continued harvesting and collection of resources, such as pine nuts, encompass most if not all of the study area for the water resources analysis (Section 3.3, Water Resources) All or substantial portions of four Native American reservations or colonies are located in White Pine or Clark counties. Population gains were registered on all four reservations between 2000 and 2010, with the number of inhabitants ranging from 143 on the Goshute Reservation to 260 on the Moapa River Reservation in 2010 (see **Table 3.18-5** for information on the resident populations on American Indian Reservations in and near the study area). However, many members affiliated with those tribal reservations, as well as members of other tribes, live outside the reservation boundaries.

A small portion of the Fort Mojave Reservation is located in extreme southern Clark County, quite removed from the study area, and three other reservations are located in surrounding counties in Nevada and Utah. Other tribes have historic cultural interests in the area. Those interests are described in additional detail in Sections 3.16, Cultural Resources, and 3.17, Native American Traditional Values, of this EIS, which address Cultural Resources and Native American Traditional Values.

The 2009 incidence of low income and poverty, as reported by the U.S. Census Bureau, was higher in the rural counties than in Clark County, with many of the affected residents also being retired and on fixed incomes (**Table 3.18-20**). Persons living in poverty in Lincoln County in 2009 were 1.2 percentage points higher, when expressed as a percent of total population, than the Nevada statewide average. Poverty rates in White Pine County were 3.4 percentage points higher, in part reflecting the influence of the inmate population at the state prison. In Millard County, the percentage of population living in poverty was about 2.9 percentage points higher than the Utah statewide average. The economic circumstances of these individuals in poverty tend to make them less mobile in terms of being able to relocate in response to adverse economic and/or social changes.

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[10] Black or African American, Hispanic or Latino, American Indian and Alaskan Native, Asian or Native Hawaiian or other Pacific Islander.

Table 3.18-19 Racial and Ethnic Population Composition in Select Counties and Geographic Comparison Areas, 2010

Geographic Area	Percentage of Total Population	
	Total Racial and Ethnic Minorities	Difference in the Percent Minority Population Above/Below the State Average
U.S.	36.3	NA
Nevada	45.9	NA
Clark County	52.0	6.1
Lincoln County	12.1	-33.8
White Pine County	23.7	-22.2
Utah	19.6	NA
Juab County	6.0	-13.6
Millard County	15.3	-4.3

Notes: Racial minorities include all persons identifying themselves in the census as a non-white race, including "Black or African American," "American Indian and Alaska Native," "Asian," "Native Hawaiian and Other Pacific Islander," "Some other race alone," and "Two or more races." Ethnic minorities include persons who identify themselves as Hispanic or Latino. Persons of Hispanic or Latino origin can identify themselves as part of any race (including white) and as persons of Hispanic or Latino origin or an ethnic minority. Total Racial and Ethnic Minorities does not include the racial group of White Alone and non-Hispanic.

Source: U.S. Census Bureau 2011b.

Table 3.18-20 Incidence of Poverty, 2009

Geographic Area	Share of Population: Below Poverty Level (%)	Difference in County Rate as Compared to State Share (Percentage Points)	Median Household Income
United States	14.3	NA	$50,221
Nevada	12.4	NA	$53,310
Clark County	12.4	0.0	$53,512
Lincoln County	13.6	1.2	$44,387
White Pine County	15.8	3.4	$48,063
Utah	11.7	NA	$55,183
Juab County	11.7	0.03	$50,589
Millard County	14.6	2.9	$44,852

Source: U.S. Census Bureau 2011b.

Opportunities for Effective Community Participation in the NEPA Process

Chapter 1 of this EIS details the Public Scoping process conducted for this EIS. Section 3.17, Native American Traditional Values, details the ongoing government-to-government consultation and other Native American consultation efforts undertaken by the BLM as part of this NEPA effort.

3.18.2 Environmental Consequences

3.18.2.1 Rights-of-way

Issues

The following issues for socioeconomic resources are considered as part of the assessment of impacts of pipeline and ancillary facility construction and operation related to the right-of-way grant application. That application is the subject of the decisions to be made by the BLM under the ROD to be issued based on this EIS. Socioeconomic effects related to groundwater development and pumping actions subject to additional NEPA and future decisions (subsequent tiers) are addressed programmatically in Section 3.18.2.8.

- The employment, income, and population/migration effects related to temporary work force requirements to build the major facilities.
- The employment, income, and population/migration related to permanent work force requirements to maintain and operate the major facilities.
- The magnitude and timing of project-related demand for temporary housing during construction and permanent housing during operation and maintenance of the pipeline and ancillary facilities.
- Demands on local infrastructure and public facilities and services during construction, operation, and maintenance of the pipeline and ancillary facilities.
- Fiscal effects on local governments and public service providers associated with project construction, operation, and maintenance of the pipeline and ancillary facilities.
- Economic effects to agriculture, tourism and recreation associated with disturbance, other construction activities and operations of the pipeline and ancillary facilities.
- Effects on quality-of-life of local residents associated with disturbance, other construction activities, and operations of the pipeline and ancillary facilities.
- Effects on social organization and conditions associated with construction and operation of the pipeline and ancillary facilities.
- The potential for construction and operation of the pipeline and ancillary facilities to result in disproportionate and adverse effects on low-income and minority populations.

Assumptions

- The project construction timetable and direct construction employment assumptions are those outlined in SNWA's POD along with supplemental information provided by SNWA, delineated by major facility component (roads, power lines, pipelines, other facilities).
- SNWA's POD specifies a range of possible pipe diameters for main pipeline with the final design contingent upon the expected volume of quantity of water to be conveyed. The current analysis assumes that the direct work force requirements for construction would not be appreciably affected by the final design and pipeline diameters.
- Direct long-term facility operating and maintenance employment will be consistent with the estimates outlined in the POD.
- Construction activities on the pipeline, transmission line and ancillary facilities will occur on a year-round basis.
- Construction on the pipeline and transmission line will generally occur in tandem/parallel, e.g., occur concurrently in the same general location, progressing from south to north along the ROW, without any substantial interruption or phasing.
- The development and operation of one or more temporary construction worker facilities are contemplated in Lincoln County during the period of construction of the pipeline and transmission lines. Potential implications of that action are addressed qualitatively.

- Potential short-term and long-term indirect effects of pipeline and ancillary facility construction on grazing are addressed based on the range resources assessment conducted for this EIS.
- Potential short-term and long-term indirect effects of pipeline and ancillary facility construction on public recreation are addressed based on the recreation assessment conducted for this EIS.
- Indirect potential for disproportionate and adverse effects on Native American populations are addressed based on cultural and Traditional Native American Values assessments conducted for this EIS.
- SNWA would be required to develop and implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in the EIS.

Methodology for Analysis

The assessment process for project-related effects on social and economic values includes review and analysis of existing conditions and trends in population and demographics, migration, economic activity, employment, labor force participation, earnings and income, poverty, land use, housing, local government facilities, services and fiscal conditions, social structure and attitudes, opinions, and lifestyles. Information was compiled from available secondary sources, augmented by interviews with local officials and residents. Additional information for the social assessment was obtained from BLM scoping documents, attendance at scoping and other public meetings, review of NSE water rights hearings filings and exhibits, and ongoing review of media coverage and communications on interest group websites.

The primary driver of socioeconomic impacts associated with construction and maintenance of the pipeline and ancillary facilities is the number of jobs associated with project construction. These jobs, the workers who fill them, and the earnings they receive, along with the capital investment made in infrastructure, initiate events, actions, and other responses that reverberate through the affected social and economic environment in the region. Effects associated with construction would be primarily short-term, while those associated with maintenance would be long-term. Given the anticipated size of the work force for these two different activities, concerns regarding potential social and economic concerns arise more in conjunction with the construction activity than with facility maintenance. Unlike many natural resource impacts, which occur within or adjacent to the ROW corridors and in the groundwater development basins, social and economic effects would also occur along the major transportation access routes and in nearby communities.

For this assessment, potential social and economic effects were identified by review and extrapolation of information contained in SNWA's POD and considered the location and timing of construction activity and size of work force employed in the context of existing social and economic conditions and community and housing capacities. The assessment was further informed by community experience with other construction projects, both within the study area and in other locations. Potential revenues associated with the construction and operation of the GWD Project were considered for their potential to offset public costs of providing services to the construction and operating work forces.

Construction and maintenance of the pipeline and ancillary facilities under the Proposed Action or Alternatives are not anticipated to have substantial effects on long-term population or economic change in the region. Such effects, to the extent they are foreseen, are addressed under the discussions of potential growth effects of construction, operation, and maintenance of the future facilities and the associated operation of the pipeline in Section 3.18.2.8.1. That section also presents a discussion of the role of imported groundwater in enabling growth in the Las Vegas Valley and in Lincoln County, which is applicable to all project alternatives.

As discussed in Section 3.18.1.1, the socioeconomic assessment covers five counties in two states and numerous communities ranging in size from hundreds to millions of residents. The setting for these communities ranges from metropolitan to very rural and somewhat isolated. The history of the GWD Project and its antecedents stretches over decades. The public record of comments on and attitudes and opinions about the GWD Project and its antecedents in formal procedures, informal forums, and in the press is voluminous. As the socioeconomic assessment progressed from

the presentation and analysis of published data, the assessment team integrated and summarized information from a variety of sources. These included prior and current local experience, experience from other areas, and professional judgment to draw conclusions from the data. The summaries of these data do not in all cases lend themselves to specific documentation, but are drawn from all of the foregoing sources. This method of integration and summarization of data based on professional judgment is common for socioeconomic assessment.

3.18.2.2 Proposed Action, Alternatives A through C

Construction

The timing, duration, and location of construction activities are important parameters in the assessment. For purposes of the EIS, SNWA's project schedule called for development extending over 12 calendar years, with actual project development activity beginning in 2012. Initial construction of the pipeline connection to the SNWA's existing system in Clark County accelerating in 2013 and 2014 with the construction of the buried storage reservoir and water treatment facility, and overall project construction extending into 2023 (SNWA 2011). The project development schedule also was factored into the pumping assumptions required for the water resources analysis. In actuality, the development schedule depends on various factors including issuance of the ROD and completion of the ROW permitting, environmental studies, projected availability of Colorado River water, future demand and market conditions, and SNWA's securing of project financing. At the same time, references to specific years in the future may better convey the sense of timing of future impacts, particularly as it may relate to other events or schedules. Thus, for purposes of this section, references to time are based on the year of construction within the 12 year schedule, for example, year 4. Were the project to begin actual construction in 2013, year 4 would equate to calendar year 2016.

After project development is initiated, the primary locus of construction is expected to begin and remain in Clark County for Years 1 and 2, then proceed south to north over time. Direct construction employment is projected to peak at 932 workers in year 4 when construction of the main pipeline, main power line, water treatment facility, and other facilities in the southern portion of the project area would occur concurrently (**Table 3.18-21**). As construction progresses, the influx of temporary workers would generate demands on public facilities and services, contributing to existing demands from residents and other temporary populations, such as tourists and hunters.

Table 3.18-21 Projected Annual Incremental Employment Associated with Construction of the Pipeline and Ancillary Facilities, Proposed Action and Alternatives A through C

Project-Related Jobs	Year of Project Development Activity											
	1	2	3	4	5	6	7	8	9	10	11	12
A. Project Direct – Peak	5	224	767	932	913	608	454	283	71	272	415	266
B. Project Direct – Average	4	190	650	787	772	515	384	240	60	231	353	226
C. Indirect/Induced Jobs[1] - Average	3	127	436	527	517	345	257	161	40	155	237	151
Total Project-Related – Annual Average (B + C)	**7**	**317**	**1,086**	**1,314**	**1,289**	**860**	**641**	**401**	**100**	**386**	**590**	**377**

[1] Indirect and induced jobs based on a 0.67 jobs multiplier.

Short-term fluctuations in direct employment, including those reflecting seasonal influences, are common on large construction projects. This assessment is based on average direct employment equal to 85 percent of the peak to account for such variability. Construction activities would continue year-round, although seasonal wildlife stipulations may preclude activity in specific locations during certain periods.

Economic data for Nevada, specifically Clark, Lincoln, and White Pine counties, indicates that each direct construction job on the project would support approximately 0.67 indirect and induced jobs in the region through the circulation of incomes, business profits, rents, and economic linkages between local industries.[13] Applying that employment

[13] The 0.67 employment multiplier was derived using IMPLAN, a professionally recognized and accepted regional economic impact model. The multiplier is based on 2007 economic data for Clark, Lincoln, and White Pine counties. Data for Millard and Juab counties in Utah were not included in the derivation of the multiplier because of the limited availability of retail trade and services in Snake Valley.

multiplier to average annual direct employment estimates for the proposed GWD Project yields total peak projected employment of 1,314 jobs in year 4 for the Proposed Action and Alternatives A through C. Direct construction employment is estimated at more than 4,400 total job-years during the construction period.[14] Purchases by SNWA, its contractors and their employees would support nearly 3,000 job-years of indirect and induced employment in the region. Many of the indirect and induced jobs would be located in Clark County throughout the project construction period due to many major construction service companies and suppliers based there and the many Clark County residents expected to fill jobs supported by the project.[15]

The geographic distribution of the project-related jobs would shift over time as the locus of construction activity moves, again generally from south to north. Many of the indirect and induced jobs, however, would remain in Clark County. The share of indirect and induced jobs based in Clark County would be higher in the earlier years, decreasing over time as construction moves northward. The changing geographic distribution of project-supported jobs is shown in **Figure 3.18-9**.

Residents of the region would fill most of the construction jobs associated with development of the Proposed Action and Alternatives A through C, as well as those supported indirectly by the project. Workers relocating to the area would fill the remainder, resulting in temporary population gains as well. Such population gains would be lowest at the outset of the project when construction of the buried storage reservoir and water treatment facility would draw on the extensive labor pool in Clark County. For this assessment, it is assumed that Clark County residents would fill 70 percent of the jobs over the period of project construction, residents of the rural areas would fill 10 percent, and non-local workers who relocate temporarily would fill the remaining 20 percent.

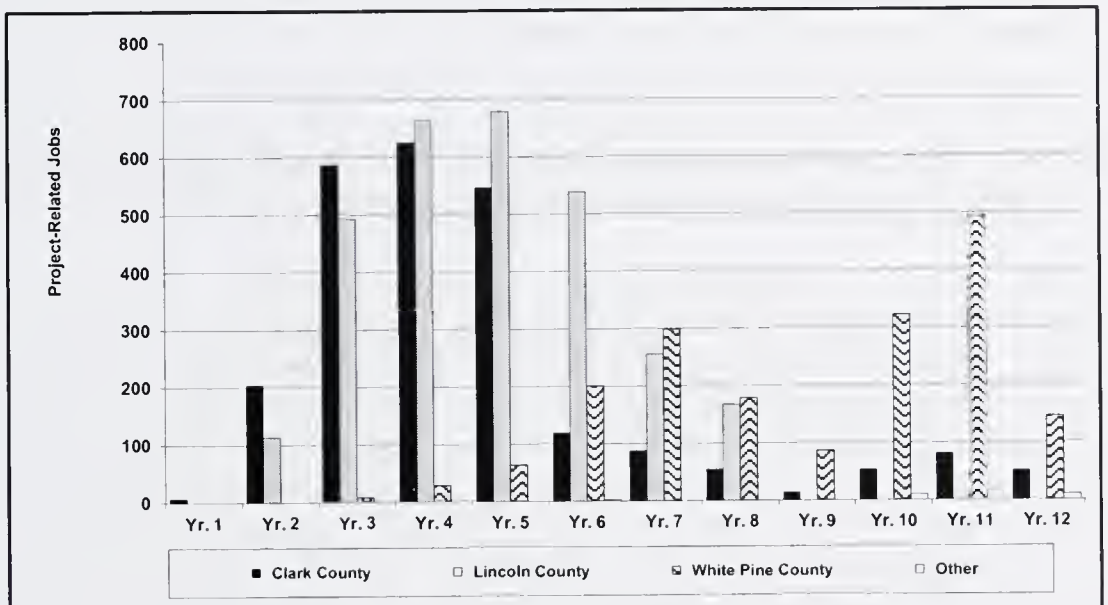

Figure 3.18-9 Geographic Distribution of GWD Project-related Jobs, Proposed Action and Alternatives A through C

Work force availability is more constrained in the rural areas and economic opportunities are relatively scarce so that construction projects like the GWD Project tend to expand the labor force, creating temporary opportunities, and generally raising wage rates in the prevailing economy. Most non-local workers employed on transmission lines and pipelines are anticipated to be single or married but not accompanied by spouses or families. However, to account for

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[14] Based on average annual employment at 85 percent of the annual peak employment presented in the POD.

[15] In this context, indirect employment includes jobs supported by SNWA and contractor purchases of goods and services from local and regional businesses. Although SNWA will purchase some goods and services in the rural areas, most will come from Las Vegas or outside the region, e.g., pipe manufacturers. Induced employment includes jobs created by employee spending of GWD Project-related income and by business, local government and school district spending in response to increased demand.

the extended duration of the construction phase, temporary population is estimated assuming 1.5 persons per non-local worker. These assumptions result in peak migration of 240 workers and a temporary population gain of up to 360 during project construction (**Table 3.18-22**). Population gains during the early years would be of little consequence within the context of the overall metropolitan population, temporary and short-term housing capacity, and large numbers of visitors that Las Vegas hosts annually.

Table 3.18-22 Projected Temporary Population Gains Associated with Construction of the Pipeline and Ancillary Facilities, Proposed Action and Alternatives A through C

	Year of Project Development Activity											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Project-Related Temporary Population Gains	2	74	276	353	360	296	221	138	35	132	203	15

As construction on the pipeline and power line moves into the Delamar Valley and then the other more northern valleys, commuting distances from Las Vegas would increase. The result would be that some non-local workers would relocate, resulting in short-term population impacts to communities in the rural area. This would occur first in Alamo, later in Caliente, Panaca, Pioche, and eventually in the Ely and Baker/Snake Valley communities. Limited availability of temporary living quarters in the larger Lincoln County communities could result in some workers seeking temporary housing in other, smaller outlying communities, such as Moapa, Logandale, Overton (years 3 thru 5) and Ursine (5 thru 7), or on private lands through informal agreements with landowners. At the end of the 12 year schedule, the temporary employment and population gains attributable to the Proposed Action or Alternatives A through C would no longer be a major contributor to temporary housing demand and demands on public sector facilities and services within the region.

Caliente, Pioche, and Panaca may experience concurrent temporary economic and population effects associated with construction of the main pipeline, transmission line, and exploratory drilling and future facilities development (see Section 3.18.2.8).

The communities of Ely, Pioche, Panaca, and Baker/Snake Valley would experience short-term population impacts again when the Snake Valley laterals are completed. The duration of temporary population impacts could range from just a few weeks to a year or longer, depending on the pace of construction, distances to and availability of housing in other communities, access routes, and other factors. Although most of these communities have prior experience hosting temporary populations associated with tourism, outdoor recreation and other construction projects, the temporary gains associated with the Proposed Action or Alternatives A through C would represent major increases in service area populations for all but Ely. The temporary populations would create incremental demands on public facilities and services, in much the same manner as, and potentially in addition to, the seasonal influxes of tourists, hunters, and OHV enthusiasts, and temporary workers associated with other unforeseen activities. The scale of the project-related incremental demands would vary over time and location.

Rural communities in Lincoln and White Pine counties would experience temporary population gains from another source as project construction moves northward. Over time, workers from Clark County who initially commute to a work site on a daily basis would likely find the daily commute to be too long and would seek temporary housing closer to the work site. In such instances, workers typically commute to the work site at the beginning of the workweek, staying over and becoming weekday residents, but returning to their permanent residence on the weekend. Given the area's proximity to the Las Vegas area, more than 500 such workers could reasonably be expected to be employed in conjunction with the Proposed Action during years 5 through 7, with nearly 300 such workers anticipated again in year 11 during construction of the Snake Valley lateral and facilities (**Figure 3.18-10**). During construction of the Snake Valley laterals, some of the temporary workers residing in the area during the workweek could reside in Millard County, Utah.

As construction of the various component facilities is completed, released workers and any spouses, relatives or friends who accompany them likely would leave to return to their permanent place of residence or to their next job location.

Consequently, little or no long-term population impacts are expected in conjunction with the construction of the main pipeline and ancillary facilities.

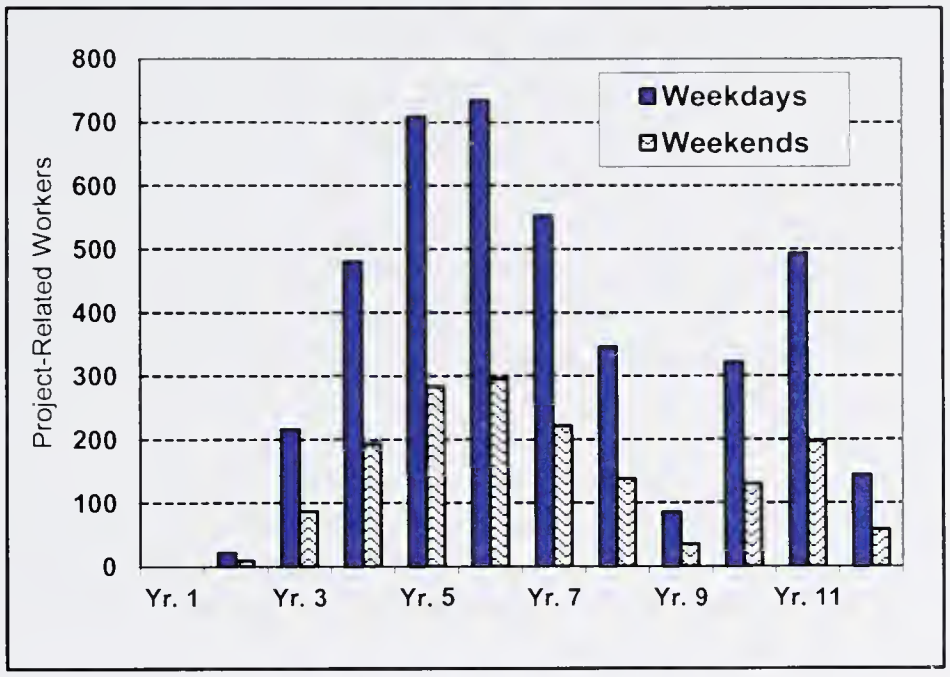

Figure 3.18-10 Project-Related Weekday versus Weekend Population Impacts in the Rural Areas During Project Construction, Proposed Action and Alternatives A through C

Construction of the Proposed Action or Alternatives A through C would result in increased demand for housing in nearby communities. Temporary housing needs would peak at 876 units in year 4, averaging 730 units within the 3-county study area in years 3 through 8. However, the needs are not "stationary" in terms of location, but shift northward over time. The total projected housing requirements, by general location, are shown in **Table 3.18-23**.

Table 3.18-23 Demand for Temporary Housing Associated with Construction of the Pipeline and Ancillary Facilities, Proposed Action and Alternatives A through C

Project-Related Housing Needs[1]	Year of Project Development Activity											
	1	2	3	4	5	6	7	8	9	10	11	12
Clark County[2]	5	197	579	556	387	82	59	37	9	35	54	35
Lincoln County[3]	0	15	140	301	430	357	171	112	0	0	0	0
White Pine County	0	0	5	19	42	133	198	119	58	215	329	97
Other	0	0	0	0	0	1	0	0	0	7	10	7
Total	**5**	**212**	**724**	**876**	**859**	**573**	**428**	**268**	**67**	**257**	**393**	**139**

[1] Based on an average occupancy of 1.5 workers per unit.

[2] Most, if not all, of the housing requirement in Clark County would be filled by the then existing housing inventory.

[3] Numbers for 2012 through 2014 reflect jobs located in Lincoln County and filled by Clark County residents.

The housing need in Clark County consists of that associated with resident construction workers, those filling indirect and induced jobs supported by the project, and workers relocating to the area to work on the project. Individuals relocating to the Las Vegas area to work on the project would create incremental housing demand, but the scale of that need is small considering the existing housing inventory and availability of temporary accommodations. Some relocating construction workers may initially seek out temporary lodging, including RV parking spaces in Moapa and Logandale, until construction progresses into Lincoln County. These workers would be inclined to shift their residence as project development progresses into Lincoln County, and eventually to White Pine County.

As project development progresses into Lincoln County, project-related housing demand, which peaks at 430 units, is substantially in excess of the inventory of approximately 250 motel rooms and RV parking spaces in the entire county.

That demand would result in upward pressure on short-term lodging rates and rental housing costs and may stimulate investment in new lodging, although the project's relatively short duration may not support such investment. The year-round nature of project-related housing demand in some communities would compete with seasonal demand from tourists and business travelers through the area. To the extent that such competition displaces tourists during the peak season, it may be viewed as an adverse impact by some, yet be viewed as a benefit to the extent that it raises overall occupancy and average nightly rates, both during the peak periods and periods of traditionally lower tourism and travel.

Over time, the demand for temporary housing would shift northward into White Pine County, peaking at over 390 units in year 11. Temporary housing in White Pine County includes approximately 1,000 motel rooms and travel trailer/RV spaces, mostly in Ely, which could potentially serve a substantial portion of the need. However, Ely is a 1-to-1.5-hours commute, each way, from the southern portion of Spring Valley and Snake Valley. Project-related demand would compete temporarily with seasonal demands for tourists, conference and other special event attendees, business travelers, and outdoor recreationists, likely supporting higher rates for lodging benefiting both the lodging establishments and local government. However, at other times the project-related demands would provide boost otherwise much lower off-season use.

Short-term demand for temporary housing associated with construction of the Snake Valley laterals would exceed the limited temporary housing existing capacity in the Baker area. Demand for housing associated with the Proposed Action could trigger development of additional RV sites and motel rooms, some of which could be located in Millard County, Utah.[16] It is not clear whether proprietors in Snake Valley would choose to expand given the relatively short-term (2 to 3 years) duration of the anticipated demand.

State parks with camping facilities and BLM campgrounds in both Lincoln and White Pine counties would see increased demand and use, thereby creating potential conflicts with traditional recreation users. The availability of these facilities to serve project-related demand would be limited by length of stay limitations and seasonal closures.

Development of a temporary construction worker housing facility offers one possible means to address shortages in short-term housing in the rural portions of the study area, particularly in Lincoln County. Operated by a contractor, temporary construction worker housing facilities typically are modular facilities that can be put in place relatively quickly. Temporary construction worker housing facilities can offer a range of services, ranging from very basic sleeping arrangements to full service operations offering sleeping, dining, mail, internet access, laundry, and recreation/leisure time facilities. Depending on the size, expected duration of use, and local development codes, a temporary construction worker housing facility may use temporary tanks for potable water and wastewater, whereas in others, the camps are connected to municipal systems. Some social and economic tradeoffs are associated with the use of a temporary construction worker housing facility. For example, there are trade-offs between jobs associated with its operation versus jobs that may have otherwise been created within the community, or reducing the pressures on local housing costs and rents at the possible expense of opportunities for local residential building contractors and landlords.

The temporary housing needs associated with the GWD Project may warrant one or more temporary construction worker housing facilities, although the SNWA has not decided on whether to require such of its contractor(s). Considering the pipeline and transmission line locations, the size of communities and commuting distances involved, and housing needs outlined above, one temporary construction worker housing facility is assumed in this assessment; that facility would be developed on private lands in central Lincoln County, become operational in year 3 with an operating staff of 30 management and housekeeping staff, and house up to 200 workers.[17] Some of the temporary construction worker housing facility staff may be hired locally, but others would be non-local and be among those residing at the temporary construction worker housing facility. For this analysis, the facility is assumed to operate

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[16] The Border Inn, one of a handful of retail and consumer service oriented businesses in the Snake Valley, is a combination convenience store, fueling station, café, casino, and motel/RV campground straddling the Utah/Nevada border near Baker, Nevada. The inn's RV sites are in White Pine County while the motel rooms are in Millard County, Utah. Similarly, the Border Inn's gaming area is in Nevada, and the retail/restaurant/gas sales components are in Utah. This unique situation creates potential impacts that could stress local capabilities and require additional coordination between state and local government agencies on both sides of the border.

[17] An alternative concept would be to see a temporary construction worker facility operating in the southern portion of Lincoln County for several years, with it subsequently relocated to the northern portion of the county to support construction in the Cave, Spring, and Snake valleys.

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through year 6 as GWD Project construction proceeds through northern Delamar, Dry Lake, and Cave valleys and into southern Spring Valley.

The job, population, and housing effects related to construction of the pipeline and ancillary facilities would result in many other short-term effects on social and economic resources in the study area. There would be a high correlation between the location of construction activity, number of construction workers employed on the project, and the timing, location, and intensity of most of these effects. Key dimensions of the related effects associated with construction of the pipeline and ancillary facilities under the Proposed Action or Alternatives A through C are summarized in **Table 3.18-24**.

Table 3.18-24 Summary of Socioeconomic Effects from Construction of the Main Pipeline and Ancillary Facilities, Proposed Action and Alternatives A through C

- The overall distribution of temporary job effects related to the Proposed Action or Alternatives A through C over the project construction schedule is estimated as follows: Clark County – 33 percent, Lincoln County – 40 percent, and White Pine County – 27 percent. *[**Note:** for the remainder of this section the term "Proposed Action" will refer to the Proposed Action or Alternatives A through C.]*
- Direct temporary employment over the 12-year development timeframe is estimated at more than 4,400 total job-years.[18] In addition, purchases by SNWA, its contractors and their employees would support nearly 3,000 job-years of indirect and induced employment in the region, averaging about 270 jobs over the 12-year project schedule.
- Implementation of the Proposed Action would generate, directly and indirectly, about $642 million in additional personal income in the region over the 12-year project development schedule. The majority of that income would accrue to Clark County residents.
- Local construction workers and contractors could benefit directly by working on the project or indirectly by working to meet community-based needs for housing, utility expansion, commercial development, and public sector needs stimulated by the project.
- A portion of project-related labor earnings would be spent locally for food and drink, housing, fuel, gaming and other entertainment, and other miscellaneous purchases, but a large portion of earnings ultimately would flow to a worker's permanent place of residence.

  In the rural areas, such local spending would provide temporary, but substantial increase in business revenues and personal income for local business owners and local workers. Local households would benefit from additional job availability for residents and upward pressures on local wages, although the effects would be temporary.
- The short-term construction activities would contribute incrementally to the demands on virtually all public facilities and services across the region, but would be focused primarily on those that would serve the temporary population and construction activities, such as law enforcement/traffic management, emergency response and medical. These demands would be in addition to the existing needs associated with current residents, businesses, tourists and other visitors to an area.

  Local perspective regarding whether the incremental demands are beneficial, adverse, or simply part of the "public" to be served, often reflects current facility conditions, available service delivery capacity and utilization, scale of demand relative to current needs, and general public sentiment towards the underlying source of the incremental demands.
- In Clark County, the economic effects related to construction would be virtually undetectable within the context of the established economy.

  Incremental demands on general government services in Clark County, e.g., the county clerk would be limited because many of the construction workers would come from among the area's current population.
- Construction of the pipeline and ancillary facilities through northern Clark County and southern Lincoln County could result in demand on temporary housing resources, law enforcement and emergency services in northeastern Clark County, including the communities of Moapa and Logandale. Local businesses in those communities would see temporary increases in business volume.
- Local school districts serving the region would be largely unaffected by the construction of the project, because few school age children are likely to accompany the nonlocal temporary construction work force.
- The NDOT, county road and bridge departments, and the BLM could experience increased road maintenance demand.

[18] Based on average annual employment at 85 percent of the annual peak employment presented in the POD.

Table 3.18-24 Summary of Socioeconomic Effects from Construction of the Main Pipeline and Ancillary Facilities, Proposed Action and Alternatives A through C (Continued)

- In the rural areas, the temporary economic effects related to construction would be quite noticeable. The most pronounced effects would be in the local hospitality industry (motels, restaurants/cafes, and bars), and convenience retail (gas stations and convenience stores).
- The temporary project-related population influx would increase demand and pressure on local law enforcement/traffic management/criminal justice, emergency response and emergency medical care systems, particularly in Lincoln and White Pine counties. Meeting the increased demand may require additional staff and higher operating budgets for the affected departments during the period when construction activity is occurring in the region.

  County attorneys, local courts, the county clerks offices, and jails would likely all experience increased caseloads/workloads during construction due to the temporary increase in population.

  The Lincoln County Sheriff might seek to hire additional deputies for a 4-to-5 year period when construction is most active in the county. The County would incur recruiting, training, and payroll costs for these officers, along with outlays for patrol vehicles and other equipment.

  White Pine County law enforcement is based in Ely. Given the distance from Ely to the worksites and the relatively large size of the construction work force working in the Spring and Snake valleys for about 5 years, additional law enforcement/criminal justice would likely be required to accommodate the increased need for services associated with the project.
- Demands on emergency services would be concentrated along the pipeline and power line corridors and ancillary facility worksites, at the temporary construction worker housing facility (if developed), in communities where construction workers reside and recreate, and along highways and roads accessing these areas.

  Emergency response times could be lengthy to rural locations where project-related construction would occur, particularly in Spring and Snake valleys where emergency services are provided by a small group of volunteers. In the event of serious or life-threatening injuries, local emergency medical response could be augmented by air ambulance transport (helicopter or fixed-wing), dispatched from the Las Vegas Valley or transport to Ely to access fixed-wing air ambulance service.

  Major construction contractors typically provide some first response capabilities, but the extent of such capabilities in conjunction with the Proposed Action is unknown at this time.

  The Nevada State Patrol and local law enforcement provide first response coverage over large areas and much of the emergency response network consists of community-based volunteers.

  Emergency medical response by community-based organizations to project-related calls would temporarily reduce coverage and increase response times to other calls in the communities. Service providers commonly seek to increase staffing levels in response to increased demand on services. In some instances, additional response vehicles and other facilities and equipment could also be warranted. Meeting such needs can be difficult for volunteer based organizations in rural areas.

  Temporary construction workers typically rely on local hospital emergency rooms for their health care needs, increasing demands on emergency room resources and staff. The increases in services generate more revenue for the facilities, but they also can experience increases in uncollected fees. In the rural areas, hospitals are located in Caliente, Ely and Delta (eastern Millard County).

  The Dils Medical Center (Caliente) provides 24-hour emergency room services and operates clinics in Alamo and Pioche. Consequently, the Center could experience a substantial increase in service demand over a multi-year period, supporting increases in professional and allied health care staffing levels.
- The Baker community supports a volunteer-based system to responds to emergency medical service needs for residents and those associated with tourists, park visitors, outdoor recreationist, and highway travelers. Serious injuries requiring transportation to Ely or Delta temporarily reduce coverage in the area. Given the reliance on volunteers, the distances between Ely and the Snake Valley and the limited law enforcement and emergency response capabilities present in Baker, project-related increases in highway accidents, medical emergencies or other incidents would place a substantial burden on local volunteer agencies and on county services during the periods when a large construction workforce would be working in Spring and Snake valleys.
- Some public water and wastewater systems in the rural areas would face short-term increases in demand associated with construction. To the extent that construction workers reside in existing motels, mobile home and RV parks, and rental housing, some or all of the associated service demands are reflected in current system operations, but in other instances, the incremental demands would represent a substantial increase over current system usage. Some systems also could experience production, treatment or storage issues based on the season or length of time that the temporary workforce resides in the community.

Table 3.18-24 Summary of Socioeconomic Effects from Construction of the Main Pipeline and Ancillary Facilities, Proposed Action and Alternatives A through C (Continued)

- Local human resource and social services agencies could see increased need for service delivery associated with the influx of employees and unemployed persons seeking work. Service delivery capacity and resources are more limited in the rural areas. Given that most construction workers are anticipated to relocate to the area in single status, social service needs from the construction workforce would likely be modest.
- Based on preliminary project cost estimates by SNWA, purchases of materials and supplies used in the construction of the future facilities would generate an estimated $48 to $59 million in state and local sales and use taxes (in $2007). Such taxes are an important source of revenues to support government operations and public education.)

  The state's general fund, public education, and local governments would benefit from such taxes. The distribution of revenues would depend on where a vendor is licensed to do business (i.e., in-state versus out-of-state and where) and designated place of delivery. Having major vendors establish a place of business in Lincoln and/or White Pine counties could increase the share of sales and use tax revenues accruing in those counties.

  State and affected county governments also would realize sales tax revenue from local retail expenditures by workers and incremental revenues from other taxes, fees, and charges for services.

  Whether the incremental tax revenues and fees would be adequate to offset the incremental public service costs in Lincoln and White Pine counties, or whether the timing of those revenues would coincide with demands for higher public service costs is unknown.
- Development of a temporary construction worker housing facility in Lincoln County would potentially reduce demand for community infrastructure and facilities associated with construction workers residing in communities.
- Prior experience on other pipeline and transmission line projects in the west has been for an increase in unauthorized RV parking/camping on public lands. Such activities can interfere with wildlife, grazing, and other authorized use, as well as create issues with trash and waste disposal and other problems.
- Ranchers with grazing permits for public lands encompassing and near the ROWs and access roads may experience temporary reductions in income due to construction-related loss of forage due to disturbance, diminished forage quality due to dust and reduced access to water resulting in reduced weight gain, injury, or death of livestock, increased injury or loss due to vehicle – livestock collisions, and the requirement for more active management.
- Outdoor enthusiasts, including OHV users, anglers and big game hunters, and local businesses that are supported by these outdoor recreationists could experience temporary adverse impacts associated with construction, such as short-term changes in access. The same or other businesses could see an increase in trade associated with the temporary workers.
- Construction of the pipeline and ancillary facilities would have little or no adverse effects on personal harvesting and resource collection activities due to the size and general location of the ROW.
- Rural portions of the study area would experience an influx of a relatively large, predominately single-status work force into the existing small, relatively cohesive, and stable social settings.
- Non-local construction workers would shop, recreate, and find lodging in nearby towns, increasing revenues for some businesses, also potentially could disrupt established social settings, including the few restaurants, bars, casinos, and other commercial and recreational settings found in the smaller rural communities.
- Some residents in these communities may focus on perceived benefits of this influx, such as welcoming the economic boost it provides; however, other residents and long-time visitors are likely to be dissatisfied with the change in these commercial, social, and recreational settings. Such dissatisfaction may be viewed as an adverse effect on the individual's quality of life.
- Opposition to the water development project may add to resident dissatisfaction in the rural areas, creating potential for conflict between construction workers and community members in some rural social and recreational settings.
- As the status of the project transitions from prospective to real, the initiation of construction of the pipeline and transmission line would be a "signal" event with potentially widespread and long-term concerns for quality of life and outlook for the future for many residents of the rural areas.
- The initiation of construction would be well-received by those who support the project because they could begin to see the prospect of additional water within a foreseeable time horizon.
- There would be increased potential for temporary, short-term increases in certain types of crime in rural communities, such as alcohol and drug-related offenses and minor assaults such as bar fights.

Table 3.18-24 Summary of Socioeconomic Effects from Construction of the Main Pipeline and Ancillary Facilities, Proposed Action and Alternatives A through C (Continued)

- Depending on the location, amenities provided, and management policies, a temporary construction worker housing facility can become a source of social disruption if large numbers of construction workers from a temporary construction worker facility frequent dining and recreation establishments in nearby towns. This could be particularly true in communities where resentment toward the project is high.
- The BLM would receive approximately $197,000 annually in ROW rents from SNWA under the Proposed Action or Alternatives A through C.
- By granting a ROW beyond that mandated by LCCRDA, concerns and dissatisfaction related to the project and BLM's granting of a ROW would be amplified, particularly in Juab, Millard, and White Pine countys. However, supporters of the project, more likely to be in Clark and Lincoln countys, would approve of the action.
- With the exception of Spring and Snake valleys, most of the ROW is located in uninhabited areas and no high concentrations of minority, low income, or Indian Tribes have been identified in those two valleys. Furthermore, no high and adverse human health and environmental effects have been identified in conjunction with the granting of the ROW and construction of the pipeline and anciallary facilities. Thus, no effects warranting consideration under the environmental justice guidelines would be anticipated.
- The temporary, short-term indirect social and economic effects related to construction traffic and construction workers would occur throughout affected communities in the region; not being concentrated or isolated in such a manner as to result in disproportionately high impacts to minority, low-income populations, or Indian Tribes.
- Sections 3.16, Cultural Resources, and 3.17, Native American Traditional Values, describe measures to avoid and mitigate potential construction-related impacts to known and currently unidentified sites of importance to Indian Tribes.

Considering the Effects of Phased or Accelerated Construction

Phased/Staged or Accelerated Construction: As described in the SNWA POD, pipeline construction would be completed as a single project, beginning in the south and progressing northward to its northern terminus. However, a revised POD could be submitted by SNWA to pursue phased construction of the main pipeline and ancillary facilities. Should the need arise, it would theoretically be possible for construction to accelerate by employing multiple construction crews working simultaneously in different sections of the corridor.

From a socioeconomics perspective, phased/staged or accelerated construction raises three primary issues: 1) effects on the overall project cost and level of labor, 2) amount of time between the successive phases, and 3) whether major redesign or rerouting is associated with the phasing or staging. The responses to these issues would largely determine if the phasing/staging or accelerated construction primarily affects timing, or if it also affects magnitude. In general, a relatively short interruption (e.g., 3 or 4 years) involving little or no redesign or routing changes, is unlikely to substantially alter the temporary socioeconomic effects compared to those described. Generally, a more lengthy delay or incorporation of major redesigns or routing would increase the likelihood for supplemental NEPA analysis prior to the re-initiation of construction.

Ongoing Facility Maintenance and Operation

The completion of construction and subsequent transition to operation would signal a marked change in the project's influence on social and economic conditions in the region. Given the high level of automation and technology involved in the operations of the pipeline and transmission line facilities, SNWA anticipates that fewer than 20 full-time staff would be required to oversee routine operation and maintenance of the entire transmission and groundwater production system. SNWA staff would be augmented by service vendors and contractors retained to perform non-routine maintenance, deliver supplies, and provide other support services. These jobs would continue over the operational life of the project, representing long-term beneficial effects of the GWD Project. Although a staffing plan identifying the number of jobs, by location, is not presently available, it would be reasonable to expect many of these jobs to be based at one or two locations in the rural portion of the study area.

The small size of the long-term work force would result in limited and virtually imperceptible, changes in employment, unemployment, personal income, resident population and demographics, housing demand, and demand on public facilities and services in the communities and counties where the workers would reside. The scale of projected growth

would be insufficient, in and of itself, to require additional staff or infrastructure capacity at local government entities and other public service providers in the rural areas.

Secondary, long-term, minor social and economic effects associated with the long-term operations and maintenance of the pipeline, power line, and ancillary facilities include the following:

- Local governments would realize long-term, but minor gains in revenues, principally from property taxes on residential development, sales taxes on consumer purchases, and miscellaneous fees and charges for services associated with staff and contractor expenditures supported by the project and by contractors.
- Retail purchases by SNWA and real property owned by SNWA are exempt from sales, use and property taxes. SNWA has negotiated a PILT agreement with White Pine County to offset a loss of revenues following SNWA's purchase of private ranches in White Pine County. No similar agreements are currently in place with other local governments or public entities with respect to the Proposed Action.
- Population-related social impacts associated with long-term facility maintenance and operations would be negligible.
- Opposition to the water development project among residents in Lincoln and White Pine counties could increase the potential for conflict between operations workers and other community members, particularly in communities and among individuals that believe they would experience only adverse effects of the project.
- No Environmental Justice impacts would arise in conjunction with project operations due to the limited scale of surface activities associated with operations of the Proposed Action, limited human inhabitation near the ROW corridors, and absence of high concentrations of minority, low income, or Indian populations in the inhabited portions of the study area.

Conclusion. Construction of the GWD Project would result in short-term economic and social effects across the study area. The effects would include beneficial economic effects, including jobs, income, and tax revenues. Short-term effects would include increased demand for temporary housing and for local services, particularly law enforcement and emergency services. Such project-related effects would be initially concentrated in the Las Vegas Valley, which has adequate capacity to meet these needs, shifting northward over time into the rural areas where capacity to meet the project-related needs is more limited. Project-related pressures on temporary housing and local services would be particularly high in conjunction with construction activity through central and northern Lincoln County.

Local governments could incur additional costs to meet project-related needs, while realizing additional tax revenues and fees. Sales and use taxes levied on the materials used in the construction of major projects would be substantial, representing an important revenue source for local governments. Whether the geographic distribution and timing of these revenues coincides with the additional project-related service costs is unclear. Long-term demands for services on local governments would likely be relatively limited.

Long-term direct and indirect economic effects from project operations would be limited due to the small numbers of workers employed on the project. Local governments and school districts would not benefit from long-term property taxes assessed on the project due to SNWA's tax-exempt status.

Short-term social effects would arise from construction of the GWD Project, primarily in conjunction with the temporary influx of construction workers into established community, recreation, and other social settings in the smaller communities. The development and operation of one or more temporary construction worker housing facility could reduce the level of disruption.

Proposed Mitigation Measures:

- SNWA would be required to develop and implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation activities. The COM Plan would integrate protective measures from

the following: BLM RMP management actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in the EIS.

ACMs include the following that are a pertinent to socioeconomics, planning, and permitting.

- (ACM-A.8.1) SNWA will coordinate in advance of construction with BLM and grazing permit holders that will be affected, to minimize access conflicts. This coordination will allow for advance planning of grazing practices to ensure continued use of the range.
- (ACM-A.8.2) Range improvements, including fence lines and cattle guards, located within the ROW and along designated access roads will be documented prior to the start of construction. If range improvements are temporarily removed or damaged as a result of construction, they will be repaired to BLM standards and be functional upon completion of construction.
- (ACM-A.8.3) If livestock is struck by a vehicle directly associated with construction activities, SNWA will ensure that the property owner is compensated for the livestock at market value.
- (ACM-A.8.4) If access to livestock watering sources or facilities is temporarily restricted during construction, alternate water source(s) will be made available for the duration that access is restricted. If livestock watering sources or facilities are damaged during construction, they will be repaired to BLM standards and be functional upon completion of construction.
- (ACM-A.12.1) SNWA will hire local companies and utilize local community resources as available for construction management support services. Bidding of work or services will be in compliance with NRS 332 and 338.
- (ACM-A.12.2) SNWA will pay White Pine County for property taxes and other lost revenue associated with purchase of private property in Spring Valley, as identified in an August 2008 agreement. SNWA will provide for a one-time payment in lieu of the County's portion of real property transfer tax on ranches acquired by SNWA, as well as an annual payment to cover other potential revenue impacts. SNWA will pay $69,000 annually for property tax, a 1-time $77,000 payment for real-property transfer tax, and $10,000 annually, indexed for inflation to replace any additional revenues.
- (ACM-A12.3, and 4) SNWA will use a Project Labor Agreement to cover the construction of the pipeline. Under the Project Labor Agreement, SNWA will require contractors to pay Clark County prevailing wage rates and employ a ratio of union employees as defined. SNWA will work with labor unions and rural governments to encourage development of trade apprenticeship programs, with the objective of developing a local skilled trade base that could be utilized during construction of the project.

The BLM NEPA Handbook (H-1790-1) states that:

> In an EIS, all "relevant, reasonable mitigation measures that could improve the project are to be identified," even if they are outside the jurisdiction of the agency (see Question 19b, CEQ, Forty Most Asked Questions Concerning CEQ's NEPA Regulations, March 23, 1981).
>
> Socioeconomic impacts are usually indirect and largely fall on communities and local government institutions, by definition located outside BLM-managed lands. While some mitigation strategies are within the BLM's control, (such as regulating the pace of mineral exploration and development to minimize rapid, disruptive social change), most mitigation strategies require action by other government entities—typically cities, counties, and State agencies. In supporting local and State efforts to mitigate socioeconomic impacts, you "may provide information and other assistance, sanction local activities, encourage community and project proponent agreements, and cooperate with responsible officials to the fullest extent feasible."

The following additional mitigation measures are recommended to help avoid, minimize, rectify, and compensate for potentially adverse, primarily short-term socioeconomic impacts.

ROW-SE-1: To Address Local Judicial and Law Enforcement Staffing and Equipment Needs. When SNWA develops its Emergency Management Plan (ACM A.1.1), SNWA would work with the boards of county commissioners of Lincoln, White Pine, and Millard counties to develop county-level Emergency Management Plans (and if needed, supplement law enforcement and criminal justice capabilities – including provision of multi-year grants for staff recruiting, training, payroll, and purchases of patrol vehicles, providing grants for training, purchases of ambulances, and associated equipment and communications equipment. The timing for financial assistant would correspond to the anticipated timing of major construction activity in/near the affected counties. Effectiveness: This measure would be effective, since pre-construction coordination with local jurisdictions would identify emergency service deficiencies and provide for training and equipment to meet these potential deficiencies. Effects on other resources: None.

ROW-SE-2: To Address Local Emergency Response Needs. The SNWA would work with the boards of county commissioners of Lincoln, White Pine and Millard counties to develop an Emergency Management Plan (see V-2 in Vegetation) – including providing grants for training, purchases of ambulances and other equipment. Some needs could also be addressed via requirements for contractor-provided on-site first response capabilities. Effectiveness: This measure would be effective, since the development of an emergency response plan with local jurisdictions provides for the development of a unified emergency strategy, early identification of emergency service requirements, and provides for training and equipment to meet these potential requirements. Effects on other resources: None.

ROW-SE-3: To Address Local Government Fiscal Needs. The SNWA would require all major contractors to obtain the necessary sales tax licenses and/or complete the necessary report to properly assign all major taxable purchases to the appropriate county of use/installation. The negotiated payments should be estimated in advance for the upcoming construction year, with adjustments made the following year for variances in actual outlays. Effectiveness: This measure would be effective and beneficial, providing revenues for local jurisdictions. Effects on other resources: None.

ROW-SE-4: **To Address Temporary Housing Needs In The Rural Areas**. In the event that one or more temporary construction worker facilities are not developed in Lincoln County during the construction of the main pipeline and transmission line, the SNWA and its major contractors would work cooperatively with the Board of County Commissioners to identify temporary housing resources, and secure additional resources if required, e.g., provide direct funding or occupancy commitment for one or more RV parks. Effectiveness: This measure would be effective and beneficial, providing revenues for local jurisdictions to support and develop temporary housing. Effects on other resources: None.

ROW-SE-5: **To Assist Local Counties and Communities Planning Efforts**. The SNWA and its contractors would prepare and distribute an annual socioeconomic monitoring report summarizing its construction activities during the past year, planned activity over the next 2 years, and key characteristics of its work force, e.g., level of employment (low, peak, average), residency patterns, turnover rates, and impacts on local communities. Representatives of local governments and service providers, for instance, the board of County Commissioners and town mayors, should be consulted regarding the scope and details addressed in this monitoring report. Effectiveness: This measure would be effective in communicating the socioeconomic effects of the project. Benefits from this report would require action on the report's findings. Effects on other resources: None.

Residual impacts include:

- There would be few residual social and economic effects associated with the Proposed Action following the completion of construction, operation start-up, and reclamation. Foreseeable effects would include new residential, commercial, and industrial development, and public infrastructure put in place in response to needs associated with the project. Residual effects may include a small number of jobs, associated income, and additional residents, primarily in the rural areas.

3.18.2.3 Alternative D

Construction

Alternative D would involve the construction and operation of a main pipeline and the associated power lines, but it would be limited to BLM-granted ROWs in Clark and Lincoln counties only. The northern terminus of those systems would be in rural Lincoln County, south of the shared boundary of Lincoln and White Pine counties. Pioche would be

the closest community, but Panaca, Caliente, Ely, Baker, and Garrison would be within a reasonable daily commuting distance.

Based on SNWA's project schedule for the Proposed Action, an 8-year construction schedule is assumed for Alternative D. As in the case of the Proposed Action, construction is assumed to begin with the buried storage reservoir and water treatment facility in Clark County, proceeding south to north over time, culminating with completion of the main pipeline and ancillary facilities in year 8. Direct construction employment is projected to peak at over 900 workers in years 4 and 5 when construction of the main pipeline, main power line, water treatment facility, and other facilities in the southern portion of the project area would occur concurrently (**Table 3.18-25**). Direct employment would decline markedly over the final 3 years of construction. Secondary employment supported by the project would exceed 500 jobs at the peak of construction.

Table 3.18-25 Projected Annual Incremental Employment Associated with Construction of the Pipeline and Ancillary Facilities, Alternative D

Project-Related Jobs	Year of Project Development Activity							
	1	2	3	4	5	6	7	8
A. Project Direct - Peak	5	224	767	932	913	608	412	151
B. Project Direct – Average (85% of Peak)	4	190	650	787	772	515	350	128
C. Indirect/Induced Jobs - Average	3	127	436	527	517	345	235	86
Total Project-Related – Annual Average (B + C)	**7**	**317**	**1,086**	**1,314**	**1,289**	**860**	**585**	**214**

Direct construction employment is estimated at nearly 3,400 total job-years when summed across the entire construction period. The direct employment and other project-related needs for services, materials, and supplies would support nearly 2,300 additional job-years of indirect and induced employment elsewhere in the region.[20]

The geographic distribution of the project-related jobs would shift over time as the focus of construction activity moves northward. Many of the indirect and induced jobs, however, would be located in Clark County throughout the project construction period because of the many major construction service companies and suppliers based there and the anticipated employment of Clark County residents to fill many jobs supported by the project.

Construction activities would continue year-round, although seasonal wildlife stipulations may preclude activity in specific locations during certain periods. Construction activity on the northern portions of the main pipeline and power line would overlap with future facilities development in the Delamar, Dry Lake, and Cave valleys (effects of future facilities development are addressed in Section 3.18.3).

Projected population gains would be lowest at the outset of the project when construction of the buried storage reservoir and water treatment facility would draw on the extensive labor pool in Clark County. Over the period of project construction, Clark County residents are assumed to fill 70 percent of the jobs, residents of the rural areas would fill 10 percent, and non-local workers who relocate temporarily would fill the remaining 20 percent. Most non-local workers employed on transmission lines and pipelines are anticipated to be single or married but not accompanied by spouses or families.

The number of non-local workers and the associated net increase in population would increase over time until it peaks at 240 workers and a temporary population gain of 360 additional residents in year 5 (**Table 3.18-26**).[21] Population gains during the early years would be of little consequence given the proximity of the construction sites to the Las Vegas metropolitan area.

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[20] Based on average annual employment at 85 percent of the annual peak employment presented in the POD.

[21] Assuming an average of 1.5 persons per non-local worker.

Temporary population gains would occur in Lincoln County and to a much lesser degree in White Pine County as project construction moves northward. As project construction moves into central Lincoln County, many workers from Clark County who initially commute to a work site would likely seek temporary housing closer to the work site. In such instances, it is common for workers to commute to the work site at the beginning of the workweek, returning to their permanent residence on the weekend. Given the area's proximity to the Las Vegas area, more than 500 such workers could reasonably be expected to be employed directly and indirectly in conjunction with Alternative D from year 5 through year 7.

Table 3.18-26 Projected Temporary Population Gains Associated with Construction of the Pipeline and Ancillary Facilities, Alternative D

	Year of Project Development Activity							
	1	2	3	4	5	6	7	8
Project-Related Temporary Population Gains	2	74	276	353	360	276	200	74

Little or no long-term population impact is expected in conjunction with the construction of the main pipeline and ancillary facilities because most of the construction workers and any spouses, other relatives, and friends who accompany them would likely leave the area as they are released, returning to their permanent place of residence or wherever their next job is located.

Construction of Alternative D would result in increased demand for temporary housing in nearby communities. Housing needs would average more than 800 units in year 4 and 5. However, much of that "need" is associated with residents of Clark County, whose housing needs would already be met. As the project moves northward, the housing needs would migrate into Lincoln County where the available inventory is much more limited. The total projected housing requirements, by general location, are shown in **Table 3.18-27**.

Table 3.18-27 Demand for Temporary Housing Associated with Construction of the Pipeline and Ancillary Facilities, Alternative D

Project-Related Housing Needs[1]	Year of Project Development Activity							
	1	2	3	4	5	6	7	8
Clark County[2]	5	197	579	556	387	77	53	19
Lincoln County[3]	0	15	140	301	430	386	304	112
White Pine County	0	0	5	19	42	71	31	11
Other	0	0	0	0	0	1	0	0
Total	**5**	**212**	**724**	**876**	**859**	**535**	**388**	**142**

[1] Based on an average occupancy of 1.5 workers per unit.

[2] Most, if not all, of the housing requirement in Clark County would be filled by the then existing housing inventory.

[3] Numbers for 2012 through 2014 reflect jobs located in Lincoln County and filled by Clark County residents.

Some construction workers who relocate to the area to work on the project may initially seek out temporary lodging in Moapa and Logandale, shifting their residence as project development progresses northward into Lincoln County. Project-related housing demand peaks at 430 units in Lincoln County, exceeding the inventory of approximately 250 motel rooms and RV parking spaces in the entire county. That demand would result in upward pressure on housing prices, compete with seasonal demand from tourists and business travelers, and may stimulate investment in new lodging. Competition with tourist demand may be viewed by some as an adverse impact, yet be viewed as a benefit during traditionally periods of low tourism and travel.

Construction of the main pipeline and main power line in southern Spring Valley under Alternative D would also create demand for temporary housing in White Pine County. Temporary housing in White Pine County includes sufficient capacity to accommodate this demand; however, because most of that capacity is in Ely, a 1-to-1½ hour commute from

the southern portion of the Spring Valley, other resources, such as state parks with camping facilities and BLM campgrounds in both Lincoln and White Pine counties could see increased demand and use. Such use would create potential conflicts with traditional recreation users. The availability of these facilities to serve project-related demand would be limited by length of stay limitations and seasonal closures.

Development of a temporary construction worker housing facility offers a means to address the projected shortages in short-term housing in Lincoln County. Temporary construction worker housing facilities are typically modular facilities that can be put in place relatively quickly. Although the SNWA has not reached a decision regarding such a facility, one such camp is assumed in this assessment. That camp is assumed to be developed on private lands in central Lincoln County, will become operational in year 3, operate through year 6, and house up to 200 workers with an operating staff of 30 employed as management and housekeeping staff.[22]

The job, population and housing effects related to construction of the pipeline and ancillary facilities under Alternative D would result in other short-term effects on social and economic resources in the study area. There would be a high correlation between the location of construction activity, number of construction workers employed on the project, and the timing, location and intensity of most of these effects. Key dimensions of the related socioeconomic effects associated with construction of the pipeline and ancillary facilities for Alternative D would be similar to those identified for the Proposed Action and Alternatives A through C in **Table 3.18-24**. The primary differences in the social and economic effects under Alternative D from those under the Proposed Action and Alternatives A through C are presented in **Table 3.18-28**.

Table 3.18-28 Summary of Socioeconomic Impacts from Construction of the Main Pipeline and Ancillary Facilities, Alternative D

- Direct construction employment is estimated at nearly 3,400 total job-years over the 8-year timeframe. Purchases by SNWA, its contractors, vendors and their employees would support nearly 2,300 job-years of secondary indirect and induced employment in the region.
- Implementation of Alternative D would generate, directly and indirectly, approximately $490 million in additional personal income in the region over the 8-year project development schedule. The majority of that personal income would accrue to Clark County residents.
- The project-related effects on employment and income would be approximately 25 percent less than under the Proposed Action and Alternatives A through C, reflecting the reduced scope and cost of the project.
- Alternative D would support higher personal income for local construction workers and contractors and other business owners and workers. The most pronounced effects would be in the local hospitality industry (motels, restaurants/cafes, and bars), and convenience retail (gas stations and convenience stores). These effects would be virtually undetectable in Clark County; however, they would be quite noticeable in Lincoln County.
- Business establishments and households in White Pine County would realize fewer economic benefits from project construction under Alternative D, as compared to the Proposed Action and Alternatives A through C.
- Incremental demands on public facilities and services would be of shorter overall duration, as compared to the Proposed Action and Alternatives A through C. White Pine County public facilities and services would experience less project related demand.
- The temporary project-related population influx would increase demand and pressure on local law enforcement/criminal justice, emergency response, and emergency medical care systems in northeastern Clark County and in Lincoln County. The Nevada State Patrol and local law enforcement provide coverage over large areas and much of the emergency response network consists of community-based volunteers.
- White Pine County law enforcement, headquartered in Ely, would likely experience little increase in project-related demand under Alternative D.
- Impacts on White Pine and Lincoln County law enforcement and emergency responders associated with construction, operation and maintenance of the Snake Valley Lateral would not occur under Alternative D.
- Direct construction-related demands for emergency response in northern Lincoln County would be served by the Lincoln County Sheriff or the Nevada State Patrol, and supported by volunteer services based in Pioche, Panaca, Caliente, or Ely. Given the distances to these communities, increases in highway accidents, medical emergencies or other incidents associated with the project could place a substantial burden on these volunteer agencies.

[22] An alternative concept would be to see a temporary construction worker facility operating in the southern portion of Lincoln County for several years and then being relocated to the northern portion of the county to support construction in the Cave, Spring, and Snake valleys.

Table 3.18-28 Summary of Socioeconomic Impacts from Construction of the Main Pipeline and Ancillary Facilities, Alternative D (Continued)

- Temporary construction workers typically rely on local hospital emergency rooms for their health care needs, increasing demands on emergency room resources and staff. Under Alternative D, the Dils Medical Center in Caliente would experience the largest increase in demand for services, extending over a multi-year period. The increase in demand would likely warrant increases in professional and allied health care staffing levels.
- Ranchers with grazing permits on public lands encompassing and near the ROWs and access roads in northern Lincoln County may experience temporary reductions in income due to construction related loss of forage due to disturbance, diminished forage quality due to dust and reduced access to water resulting in reduced weight gain, injury, or death of livestock, increased injury or loss due to vehicle – livestock collisions, and the requirement for more active management. Grazing on allotments in White Pine County is at lower risk for adverse impacts.
- Outdoor enthusiasts, including OHV users, anglers and big game hunters, outfitters, and other local businesses that are supported by these outdoor recreationists could experience temporary impacts associated with construction, such as changes in access.
- Construction of the pipeline and ancillary facilities would have little or no adverse effects on personal harvesting and resource collection activities due to the size and general location of the ROW.
- Whether the incremental tax revenues and fees generated indirectly by the project would be adequate to offset the incremental public service costs in Lincoln County or whether the timing of those revenues would coincide with demands for higher public service costs is unknown.
- Communities in the rural portions of the study area, primarily Alamo, Caliente, Panaca, and Pioche, would experience an influx of a relatively large, predominately single-status work force into the existing small, relatively cohesive and stable social settings.
- The presence of relatively large numbers of construction workers would increase revenues for some businesses but could potentially disrupt social settings including the few restaurants, bars, casinos, and other commercial and recreational settings in these small communities.
- Some residents in these communities may focus on perceived benefits of this influx, such as welcoming the economic boost it provides; however, other residents are likely to be dissatisfied with the change in local commercial, social, and recreational settings.
- Opposition to the water development project may add to resident dissatisfaction in Lincoln County, creating potential for conflict between construction workers and community members in some social and recreational settings.
- By limitng the ROW to that mandated by LCCRDA, concerns and dissatisfaction related to the project and BLM's granting of a ROW would be reduced, particularly in Juab, Millard, and White Pine countys. However, supporters of the project would be disappointed. Parties holding either view would understand the potential for future events to affect the ROW.
- The BLM would receive approximately $165,000 annually in ROW rents from SNWA under Alternative D.
- Most of the ROW is located in uninhabited areas. Consequently, no high concentrations of minority, low income, or Indian Tribes exist in proximity to the ROW. Furthermore, no high and adverse human health and environmental effects have been identified in conjunction with the granting of the ROW and construction of the pipeline and ancillary facilities. Thus, no effects warranting consideration under the environmental justice guidelines would be anticipated.
- The temporary, short-term indirect social and economic effects related to construction traffic and construction workers would occur throughout affected communities in the region; not being concentrated or isolated in such a manner as to result in disproportionately high and adverse impacts to minority or low-income populations or Indian Tribes.
- Sections 3.16, Cultural Resources, and 3.17, Native American Traditional Values, describe measures to avoid and mitigate potential construction-related impacts to known and currently unidentified sites of importance to Indian Tribes.

Ongoing Facility Maintenance and Operation

Completion of project construction and subsequent transition to operations would be accompanied by changes in the project's influence on social and economic conditions in the region. Under Alternative D, the SNWA likely would employ fewer than 20 full-time staff to oversee routine operation and maintenance of the entire transmission and groundwater production system, with its own staff of service vendors and contractors retained to perform non-routine maintenance, deliver supplies, and provide other support services. The small size of the operations and maintenance work force would result in limited changes in employment, unemployment, personal income, resident population and demographics, housing demand, and on public facilities and services, comparable to those that would occur under the

Proposed Action (see the discussion under Facility Maintenance in 3.18.2.2). The scale of projected growth would be insufficient, in and of itself, to require additional staff or infrastructure capacity at any of the local government entities and other public service providers in the rural areas. These effects would continue over the operational life of the project. The principal difference under Alternative D would be the virtual elimination of effects in White Pine County.

Conclusion. Construction of the GWD Project would result in short-term economic and social effects across the study area, similar to those under the Proposed Action. The effects would include beneficial economic effects, including jobs, income, and tax revenues. Short-term effects would also include increased demand for temporary housing and for local services, particularly law enforcement, and emergency services. Such project-related effects would be initially concentrated in the Las Vegas Valley, which has adequate capacity to meet these needs, but shift northward into Lincoln County where capacity to meet the project-related needs is more limited. Project-related pressures on temporary housing and local services would be particularly high in conjunction with construction activity through central and northern Lincoln County.

Local governments could incur additional costs to meet the needs, while realizing additional tax revenues and fees. Sales and use taxes levied on materials used in the construction of major projects are typically an important revenue source for local governments. Such revenues would not be generated on materials and equipment used in the pipeline and power lines due to the SNWA's tax-exempt status as a quasi-governmental entity.

Social and economic effects on the Baker/Snake Valley community associated with project construction and maintenance would be avoided under Alternative D.

Long-term direct and indirect economic effects from project operations would be limited due to the small numbers of workers employed on the project. Local governments and school districts would not benefit from long-term property taxes assessed on the project due to the SNWA's tax-exempt status.

Short-term social effects would arise from construction of the GWD Project, primarily in conjunction with the temporary influx of construction workers into established community, recreation and other social settings in the smaller communities. The development and operation of one or more temporary construction worker camps could reduce the level of disruption.

Proposed mitigation measures:

- SNWA would be required to develop and implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in the EIS.

ACMs include the following that are pertinent to socioeconomics, planning, and permitting.

- (ACM-A.8.1), (ACM-A.8.2), (ACM-A.8.3), (ACM-A.8.4), (ACMs-A.12.1 and A.12.4).

Per guidance provided by the BLM NEPA Handbook (H-1790-1), the following additional mitigation measures, defined in Section 3.18.2.2 above, are recommended to help avoid, minimize, rectify, and compensate for potential socioeconomic impacts under Alternative D: ROW-SE-1, ROW-SE-2, ROW-SE-3, ROW-SE-4, and ROW-SE-5. The monitoring and mitigation measures identified for the Proposed Action would apply in Alternative D, but would be focused on Lincoln County because the main pipeline would not extend into White Pine County. Consultation and coordination should involve White Pine County in the last 2 years of construction due to potential temporary service demand impacts from workers residing in White Pine County.

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Residual impacts include:

- There would be few residual social and economic effects associated with Alternative D following the completion of construction, operation start-up, and reclamation. Foreseeable effects would include new residential, commercial, and industrial development and public infrastructure put in place in response to needs associated with the project. Residual effects may include a small number of jobs, associated income, and additional residents, primarily in the rural areas.

3.18.2.4 Alternatives E and F

Construction

Alternatives E and F would involve the construction and operation of a main pipeline and the associated power lines on BLM-granted ROWs in Clark, Lincoln, and White Pine counties. The northern terminus of those systems would be in the Spring Valley in White Pine County. Alternatives E and F would not include lateral pipeline and groundwater production development in Snake Valley. Based on SNWA's project schedule for the Proposed Action, a 9-year construction schedule is assumed for construction of the main pipeline and ancillary facilities for Alternatives E and F. Direct construction employment would peak in years 4 and 5 when construction activity of the main pipeline, main power line, water treatment facility, and other facilities in the southern portion of the project area would occur concurrently (**Table 3.18-29**). Following peak activity, direct employment would decline as the project moves northward. Secondary employment supported by the project would exceed 500 jobs at the peak of construction.

Construction of Alternatives E and F would provide nearly 3,600 total job-years of direct employment during the construction period, supporting nearly 2,400 job-years of indirect and induced employment elsewhere in the region. Under Alternatives E and F, the geographic distribution of the project-related direct, indirect and induced jobs shifts northward over time, although many of the indirect and induced jobs would be located in Clark County through the project construction period. Over the period of project construction, Clark County residents are assumed to fill 70 percent of the jobs. Most non-local workers employed on transmission lines and pipelines are anticipated to be single, or if married, not accompanied by spouses or families.

Table 3.18-29 Projected Annual Incremental Employment Associated with Construction of the Pipeline and Ancillary Facilities, Alternatives E and F

Project-Related Jobs	Year of Project Development Activity								
	1	2	3	4	5	6	7	8	9
A. Project Direct – Peak	5	224	767	932	913	608	454	283	71
B. Project Direct – Average (85% of Peak)	4	190	650	787	772	515	384	240	60
C. Indirect/Induced Jobs – Average	3	127	436	527	517	345	257	161	40
Total Project-Related – Annual Average (B + C)	**7**	**317**	**1,086**	**1,314**	**1,289**	**860**	**641**	**401**	**100**

Construction activities would continue year-round, although seasonal wildlife stipulations may preclude activity in specific locations during certain periods. Construction activity on the northern portions of the main pipeline and power line would overlap with future facilities development in the Delamar, Dry Lake, and Cave valleys (effects of future facilities development are addressed in Section 3.18.3).

Projected population gains would be lowest at the outset of the project when construction of the buried storage reservoir and water treatment facility draws on the extensive labor pool in Clark County. The number of non-local workers and the associated net increase in population would increase over time, eventually peaking at 240 workers, with an associated temporary population gain of 360 additional residents in year 5 (**Table 3.18-30**). Population gains during the first several years would be of little consequence given the proximity of the construction sites to the Las Vegas metropolitan area.

Table 3.18-30 Projected Temporary Population Gains Associated with Construction of the Pipeline and Ancillary Facilities, Alternatives E and F

	Year of Project Development Activity								
	1	2	3	4	5	6	7	8	9
Project-Related Temporary Population Gains	2	74	276	353	360	296	221	138	35

Temporary population gains would occur in Lincoln and White Pine counties as project construction moves northward. Over time, many resident workers from Clark County who initially commute to work daily would likely seek temporary housing closer to the work site, commuting to the work site at the beginning of the workweek, then returning home on the weekend. Given the area's proximity to the Las Vegas metropolitan area, more than 500 such workers could reasonably be expected to be directly and indirectly employed in conjunction with Alternatives E and F in years 3 thru 6.

Little or no long-term population impact is expected in conjunction with the construction of the main pipeline and ancillary facilities because most of the construction workers and any spouses, other relatives, and friends who accompany them would likely leave the area as they are released, returning to their permanent place of residence or wherever their next job is located.

Construction of Alternatives E and F would result in increased temporary housing demand in nearby communities. Housing needs would average more than 800 units in the years 4 and 5. Much of that "need" occurs in Clark County, where an inventory of housing exists. As the project moves northward, the housing needs would migrate into Lincoln and White Pine counties where availability is more constrained. The total projected housing requirements, by general location, are shown in **Table 3.18-31**.

Table 3.18-31 Demand for Temporary Housing Associated with Construction of the Pipeline and Ancillary Facilities, Alternatives E and F

Project-Related Housing Needs[1]	Year of Project Development Activity								
	1	2	3	4	5	6	7	8	9
Clark County[2]	5	197	579	556	387	82	59	37	9
Lincoln County[3]	0	15	140	301	430	357	171	112	0
White Pine County	0	0	5	19	42	133	198	119	58
Other	0	0	0	0	0	1	0	0	0
Total	**5**	**212**	**724**	**876**	**859**	**573**	**428**	**268**	**67**

[1] Based on an average occupancy of 1.5 workers per unit.

[2] Most, if not all, of the housing requirement in Clark County would be filled by the then existing housing inventory.

[3] Numbers for 2012 through 2014 reflect jobs located in Lincoln County and filled by Clark County residents.

Project-related housing demand peaks at 430 units in Lincoln County, exceeding the available inventory of motel rooms and RV parking spaces. That demand would result in upward pressure on housing prices, would compete with seasonal demand from tourists and business travelers throughout the area, and may stimulate investment in new lodging. Competition with tourist demand may be viewed by some as an adverse impact, yet be viewed as a benefit during periods of traditionally low tourism and travel.

Demand for temporary housing in White Pine County would result under Alternatives E and F in conjunction with construction activities in Spring Valley. Short-term demand would peak at nearly 200 units in year 7. Sufficient temporary housing exists in White Pine County to accommodate this demand. However, because most of that capacity is in Ely, a 1-to-1.5 hour commute from Spring Valley, some workers may seek temporary housing opportunities elsewhere. State parks with camping facilities and BLM campgrounds in both Lincoln and White Pine counties would

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see increased demand and use, thereby creating potential conflicts with traditional recreation users. The availability of these facilities to serve project-related demand would be limited by length of stay limitations and seasonal closures.

Alternatives E and F could result in limited temporary housing demand and population gains in the Baker/Snake Valley during construction of the Spring Valley segments, but Ely offers a larger base of lodging, retail, and service establishments at about the same commuting distance as Baker.

Development of a temporary construction worker housing facility offers a means to address the projected shortages in short-term housing in Lincoln and White Pine counties.

The job, population, and housing effects related to construction of the pipeline and ancillary facilities under Alternatives E and F would result in many other short-term effects on social and economic resources in the study area. There would be a high correlation between the location of construction activity, number of construction workers employed on the project, and the timing, location and intensity of most of these effects. Key dimensions of the related socioeconomic effects associated with construction of the pipeline and ancillary facilities for Alternatives E and F would be similar to those identified for the Proposed Action and Alternatives A through C in **Table 3.18-24**. The primary differences in the social and economic effects under Alternatives E and F from those under the Proposed Action and Alternatives A through C are presented in **Table 3.18-32**.

Table 3.18-32 Summary of Socioeconomic Impacts from Construction of the Main Pipeline and Ancillary Facilities, Alternatives E and F

- Direct construction employment is estimated at more than 3,600 total job-years over the construction period. Purchases by SNWA, its contractors and their employees would support nearly 2,400 job-years of secondary indirect and induced employment in the region.
- Implementation of Alternatives E and F would directly and indirectly generate about $524 million in additional personal income in the region over the 9-year project development schedule. The majority of that personal income would accrue to Clark County residents.
- The project-related effects on employment and income would be approximately 20 percent less than under the Proposed Action and Alternatives A through C, which reflect the reduced scope and cost of the project.
- Alternatives E and F would support higher personal income for local business owners and local workers. In Clark County, these effects would be virtually undetectable within the context of the established economy; however, they would be quite noticeable in Lincoln County. The most pronounced effects would be in the local hospitality industry (motels, restaurants/cafes, and bars), and convenience retail (gas stations and convenience stores).
- A portion of project-related earnings would be spent locally for food and drink, housing, fuel, gaming and other entertainment, and other miscellaneous purchases, but a large portion of earnings ultimately flows to a worker's permanent place of residence. Households would benefit from additional job availability for local residents and upward pressures on local wages, although the effects would be temporary.
- The temporary project-related population influx would increase demand and pressure on local law enforcement/criminal justice, emergency response and emergency medical care systems in northeastern Clark and in Lincoln and White Pine counties.

  The Nevada State Patrol and local law enforcement provide coverage over large areas and much of the emergency response network consists of community-based volunteers.

  Local law enforcement provides coverage over large areas and much of the emergency response network consists of community-based volunteers. Response to project-related needs would reduce coverage and increase response times for residents in communities. The increased demand would support additional staffing, response vehicles, and other facilities and equipment, which can be difficult to secure for volunteer based organizations in rural areas. The increased demands would occur over a period of years, shifting as the project moves northward.
- White Pine County law enforcement is headquartered in Ely. Given the distance from Ely to the worksites and the relatively large size of the construction work force working in the Spring Valley for about 5 years, additional law enforcement/criminal justice likely would be required to accommodate service demand from the project.
- The Baker/Snake Valley might experience some increase in demands for emergency response support from construction activities in the Spring Valley, but not as much as would have occurred with the construction of a lateral pipeline and groundwater production well field in the valley.

Table 3.18-32 Summary of Socioeconomic Impacts from Construction of the Main Pipeline and Ancillary Facilities, Alternatives E and F (Continued)

- Direct construction-related demand would occur in Spring Valley where emergency response services are currently provided by community-based services, staffed by volunteers. Due to the distances between Spring Valley and current service providers, increases in highway accidents, medical emergencies or other incidents associated with the project would place a substantial burden on these volunteer agencies. During the 2 to 3 years when industrial activity and a large construction workforce would be present, additional emergency response capabilities would be desirable.
- Impacts on White Pine and Lincoln County law enforcement and emergency responders associated with construction, operation and maintenance of the Snake Valley Lateral would not occur under Alternatives E and F.
- Temporary construction workers typically rely on local hospital emergency rooms for their health care needs, increasing demands on emergency room resources and staff. The increases in services generate more revenue for the facilities, but they also can experience increases in uncollected fees. Within the affected rural areas, hospitals are located in Caliente and Ely.

  Under Alternatives E and F, the Dils Medical Center in Caliente could experience a substantial increase in demand for services, extending over a multi-year period. The increase demand would likely warrant increases in professional and allied health care staffing levels.

  Emergency response times to rural locations where project-related construction would occur could be lengthy. In the event of serious or life-threatening injuries, local emergency medical response could be augmented by air medical ambulance transport dispatched from the Las Vegas Valley.
- The NDOT, county road and bridge departments, and the BLM could experience increased road maintenance demand.
- Ranchers with grazing permits on public lands encompassing and near the ROWs and access roads in northern Lincoln County and the Spring Valley portion of White Pine County may experience temporary reductions in income due to construction related loss of forage due to disturbance, diminished forage quality due to dust and reduced access to water resulting in reduced weight gain, injury, or death of livestock, increased injury or loss due to vehicle – livestock collisions, and the requirement for more active management. Grazing on allotments in the Snake Valley portion of White Pine County is at low risk for adverse impacts.
- The presence of relatively large numbers of construction workers could potentially disrupt social settings including the few restaurants, bars, casinos and other commercial and recreational settings in these small communities.
- Construction of the pipeline and ancillary facilities would have little or no adverse effects on personal harvesting and resource collection activities due to the size and general location of the ROW.
- Some residents in these communities may focus on perceived benefits of this influx, such as welcoming the economic boost it provides; however, other residents are likely to be dissatisfied with the change in these commercial, social, and recreational settings.
- Opposition to the water development project may add to resident dissatisfaction in the rural areas, creating potential for conflict between construction workers and community members in some social and recreational settings.
- By issuing a ROW beyond that mandated by LCCRDA, but avoiding the Snake Valley, concerns and dissatisfaction related to the project and BLM's granting of a ROW would be reduced, particularly in Juab, Millard, and White Pine countys. However, supporters of the project would be disappointed. Parties holding either view would understand the potential for future events to affect the ROW status in Snake Valley.
- By moving the status of the project from prospective to real, construction of the pipeline and transmission would be a "signal" event with potentially widespread and long-term concerns for quality of life and outlook for the future.
- There would be increased potential for temporary, short-term increases in certain types of crime in rural communities, such as alcohol and drug-related offenses and minor assaults such as bar fights.
- The BLM would receive approximately $180,000 annually in ROW rents from SNWA under Alternatives E or F.
- With the exception of Spring Valley, most of the ROW is located in uninhabited areas and no high concentrations of minority, low income, or Indian Tribes have been identified in that valley. Furthermore, no high and adverse human health and environmental effects have been identified in conjunction with the granting of the ROW and construction of the pipeline and ancillary facilities. Thus, no effects warranting consideration under the environmental justice guidelines would be anticipated.
- The temporary, short-term indirect social and economic effects related to construction traffic and construction workers would occur throughout affected communities in the region; not being concentrated or isolated in such a manner as to result in disproportionately high and adverse impacts to minority or low-income populations or Indian Tribes.
- Sections 3.16, Cultural Resources, and 3.17, Native American Traditional Values, describe measures to avoid and mitigate potential construction-related impacts to known and currently unidentified sites of importance to Indian Tribes.

Ongoing Facility Maintenance and Operation

Completion of project construction and subsequent transition to operations would be accompanied by changes in the project's influence on social and economic conditions in the region. Under Alternatives E and F, SNWA would likely employ fewer than 20 full-time staff to oversee routine operation and maintenance of the entire transmission and groundwater production system, with its own staff of service vendors and contractors retained to perform non-routine maintenance, deliver supplies, and provide other support services. The small size of the operations and maintenance work force would result in limited changes in employment, unemployment, personal income, resident population and demographics, housing demand, and on public facilities and services, comparable to those that would occur under the Proposed Action (see the discussion under Facility Maintenance in 3.18.2.2 above). The scale of projected growth would be insufficient, in and of itself, to require additional staff or infrastructure capacity at any of the local government entities and other public service providers in the rural areas. These effects would continue over the operational life of the project. The principal difference under Alternatives E and F would be a dramatic reduction of potential effects in the Snake Valley portion of White Pine County as compared to the Proposed Action.

Conclusion. Construction of the GWD Project would result in short-term economic and social effects across the study area, similar to those under the Proposed Action. The effects would include beneficial economic effects, including jobs, income, and tax revenues. Short-term effects also would include increased demand for temporary housing and for local services, particularly law enforcement, and emergency services. Such project-related effects would be initially concentrated in the Las Vegas Valley, which has adequate capacity to meet these needs, but shift northward into Lincoln and White Pine counties where capacity to meet the project related needs is more limited. Project-related pressures on temporary housing and local services would be particularly high in conjunction with construction activity through central and northern Lincoln County.

Social and economic effects on the Baker/Snake Valley community associated with project construction and maintenance would be avoided under Alternatives E and F.

Long-term direct and indirect economic effects from project operations would be limited due to the small numbers of workers employed on the project. Local governments and school districts would not benefit from long-term property taxes assessed on the project due to the SNWA's tax-exempt status.

Short-term social effects would arise from construction of the GWD Project, primarily in conjunction with the temporary influx of construction workers into established community, recreation, and other social settings in the smaller communities. The development and operation of one or more temporary construction worker camps could reduce the level of disruption.

Proposed mitigation measures:

- SNWA would be required to develop and implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in the EIS.

ACMs include the following that are pertinent to socioeconomics, planning, and permitting.

- (ACM-A.8.1), (ACM-A.8.2), (ACM-A.8.3), (ACM-A.8.4), (ACMs-A.12.1 through A.12.4).

Per guidance provided by the BLM NEPA Handbook (H-1790-1), the following additional mitigation measures, defined in Section 3.18.2.2, are recommended to help avoid, minimize, rectify and compensate for potential socioeconomic impacts under Alternatives E and F: ROW-SE-1, ROW-SE-2, ROW-SE-3, ROW-SE-4, and ROW-SE-5. The monitoring and mitigation measures identified for the Proposed Action would apply for Alternatives E and F, but would be more focused on Lincoln County. Consultation and coordination should involve White Pine County in the last two years of construction due to potential impacts from temporary workers residing in White Pine County.

Residual impacts include:

- There would be few residual social and economic effects associated with Alternatives E and F following the completion of construction, operation start-up, and reclamation. Foreseeable effects would include new residential, commercial, and industrial development and public infrastructure put in place in response to needs associated with the project. Residual effects may include a small number of jobs, associated income, and additional residents, primarily in the rural areas.

3.18.2.5 Comparison of Alternatives

Construction, operation, and maintenance of all of the action alternatives would result in short-term social and economic effects across the socioeconomic study area. Differences between the alternatives primarily reflect differences in the scale of the project, as defined in terms of miles of pipeline and power lines built and the costs associated with those differences. In fact, this assessment assumes the same level and timing of employment for the first 6 years of project development, e.g., no significant adjustments in capacity of the water treatment/storage facility or construction employment. Differences beyond 6 years relate primarily to the lengths and locations of pipeline and power line construction. As construction advances northward, the basic types of social and economic impacts continue, but the group of affected communities and the intensity of effects experienced in a particular community change. Consequently, the primary differentiation among the alternatives would be the extent of effects in White Pine County, particularly with respect to Baker/Snake Valley (**Table 3.18-33**).

Table 3.18-33 Socioeconomic Impact Summary for Construction of the Main Pipeline and Ancillary Facilities, Proposed Action and Alternatives A through F

	Proposed Action and Alternatives A through C	Alternative D	Alternatives E and F
Total Job-years of Construction-Related Temporary Employment	~ 7,400 over 12 years	~ 5,700 over 8 years	~ 6,000 over 9 years
Incremental Personal Income Generated in the Region	$ 642 Million	$ 490 Million	$ 524 Million
Noticeable Social and Economic Effects in Clark and Lincoln Counties? [Relative ranking / differences]	Yes [Base Case]	Yes [same in Clark County, lower in Lincoln]	Yes [same in Clark County, lower in Lincoln]
Noticeable Social and Economic Effects in White Pine County	Yes/Yes	No/No	Yes/Yes
Noticeable Social and Economic Effects in Baker/Snake Valley	Yes/Yes	No/No	No/No

3.18.2.6 Alignment Options 1 through 4

Alignment Options 1 through 4 would involve changes in pipeline and/or transmission line alignments, along with associated changes in ancillary facility design, such as addition of another pump station, to achieve the necessary engineering and design parameters. Each alignment option would result in minor differences in employment, timing, or other linkages to social and economic effects in the region, as compared to the Proposed Action or other alternatives. The assessment of the net implications of these is presented in **Table 3.18-34**.

Table 3.18-34 Socioeconomic Impact Summary for Construction and Operations, Alignment Options 1 through 4

Alignment Option 1 In this option, the Humboldt-Toiyabe power line would parallel an existing transmission line between Spring Valley and the Gonder Substation. Due to the location of the affected segment of the transmission line, Alignment Option 1 would not result in social and economic impacts, including those related to environment justice in Clark and Lincoln countys. Alignment Option 1 would be approximately 8 miles shorter, but cross steeper terrain than the alignment included under the Proposed Action. These differences likely result in some offsetting implications in terms of their effects on the number of construction workers involved, duration of construction activity, and construction costs. Although the net effect of these differences is unclear, the scale of the changes would not be expected to result in appreciably different short-term, construction related social and economic impacts in White Pine County from those anticipated under the Proposed Action. The ROW for Alignment Option 1 would involve lands managed by the USFS and some private land, whereas only public lands are associated with the ROW for the Proposed Action. Long-term social and economic effects related to pipeline and ancillary facility operations and maintenance, assuming the implementation of Alignment Option 1, would include limited scale for direct and secondary employment, population, housing demand, demands on public facilities and service, fiscal effects, and additional social interactions. These effects would not be significant in the context of current conditions or future conditions given implementation of the remainder of the project. Social and economic effects associated with the Future Facilities would be unaffected by Alignment Option 1.
Alignment Option 2 This option would change the location of the main pipeline and associated power line in North Lake Valley, collocating more of the project facilities within the Highway 93 corridor. Implementation of this option would require an additional pump station, allow another pump station to be smaller, alter the pipeline and power line requirements in portions of North Lake Valley, and increase the total length of the main pipeline by approximately 5 miles. Due to the location of the affected segment of the transmission line, Alignment Option 2 would not result in social and economic impacts, including those related to environment justice, in Clark County. Construction of the added length of pipeline and pump station would require a larger work force, employed for a slightly longer duration in Lincoln County. Those effects would be offset by reducing the level of construction associated with another pump station, power lines, and the pipeline for the North Valley lateral. The latter changes would be accomplished by either employing a smaller work force, reducing the duration of activity, or some combination thereof. The net effects of the differences are unclear, and while likely not significant, would result in minor changes in effects within Lincoln County and the communities of Pioche, Panaca and Caliente. Long-term social and economic effects related to pipeline and ancillary facility operations and maintenance, assuming the implementation of Alignment Option 2, would include limited scale for direct and secondary employment, population, housing demand, demands on public facilities and service, fiscal effects, and additional social interactions. These effects would be relatively inconsequential in the context of current conditions or future conditions given implementation of the remainder of the project. Social and economic effects associated with the Future Facilities would unaffected by Alignment Option 2.
Alignment Option 3 This option eliminates the proposed main power line between Spring Valley and the Gonder substation, providing an alternative connection to another major regional power line in northern Lincoln County. No such alternative presently exists. Consequently, the potential to implement Alignment Option 3 is contingent upon development of another power line. Implementation of Alignment Option 3 would eliminate the need for 34 miles of transmission line and allow use of a 138 kV main power line. A new substation would be built, as would an intertie between the substation and the main power line. Due to the location of the affected segment of the transmission line, Alignment Option 3 would not result in social and economic impacts, including those related to environment justice, in Clark County. Construction of the substation would require a larger work force, employed for a slightly longer duration in Lincoln County. That effect would be offset by reducing the level of construction in White Pine County, either by employing a smaller work force, reducing the duration of activity, or some combination thereof. The net effects of the differences are unclear, and while not likely to be significant, would result in minor shifts in the incidence of effects; slightly higher/increased/longer in Lincoln County and the communities of Pioche, Panaca, and Caliente, and slightly lower/decreased/shorter in White Pine County and the city of Ely. Long-term social and economic effects related to pipeline and ancillary facility operations and maintenance, assuming the implementation of Alignment Option 3, would be limited in scale for direct and secondary employment, population, housing demand, demands on public facilities and service, fiscal effects, and additional social interactions. These effects would not be significant in the context of current conditions or future conditions given implementation of the remainder of the project. Social and economic effects associated with the Future Facilities would unaffected by Alignment Option 3.

Table 3.18-34 Socioeconomic Impact Summary for Construction and Operations, Alignment Options 1 through 4 (Continued)

Alignment Option 4
Alignment Option 4 would realign a segment of the main pipeline and power line through the Delamar Valley. The realigned segment would be approximately 2 miles shorter, but involves traversing an elevation grade that requires construction of an additional pump station.
Due to the location of the affected segment of the transmission line, Alignment Option 4 would not result in social and economic impacts, including those related to environment justice, in Clark or White Pine counties.
The shorter length of main pipeline and additional pump station associated with Alignment Option 4 likely would result in some changes in workforce and/or changes in construction activity duration in Delamar Valley and would affect project costs. To some extent, the effects associated with these changes would offset each other. Although the net effects of these differences on short-term, construction-related social and economic impacts would occur in Lincoln County, they likely would be negligible with the context of the overall project. Any effects would be temporary, the incidence of which would be focused on the communities of Alamo and Caliente.
The ROW for Alignment Option 4 would involve only public lands, whereas the ROW for the segment included in the Proposed Action would involve public, State and some private land.
Long-term social and economic effects related to pipeline and ancillary facility operations and maintenance, assuming the implementation of Alignment Option 4, would include limited scale for direct and secondary employment, population, housing demand, demands on public facilities and service, fiscal effects, and additional social interactions. These effects would not be significant in the context of current conditions or future conditions given implementation of the remainder of the project.
Social and economic effects associated with the Future Facilities would be unaffected by Alignment Option 4.

3.18.2.7 No Action

Under the No Action Alternative, the pipeline project and ancillary facilities, as proposed by SNWA in their POD (**Appendix E**), would not be constructed or maintained. No project-related effects on employment, population, housing demand, demands on public facilities and services, fiscal effects, or social conditions would occur. Social and economic conditions in the region would continue to be influenced by national and international events and policies beyond local control, climate change, and local actions and events taken by public agencies, private enterprises, and individuals. Some of the actions and events would occur on public lands managed per directions set forth in the Ely and Las Vegas RMPs.

3.18.2.8 Groundwater Development and Groundwater Pumping

Subsequent to decisions by the NSE approving the SNWA's applications for water rights, the SNWA would embark on a groundwater exploration and development program. Depending on the alternative and anticipated average production per well, that program would result in the completion of 83 to 174 production wells in the 5 groundwater production basins. The wells would be completed over time, with the specific locations and development to be determined in the future. The ROW applications for those wells, along with associated collector pipelines, power lines and other future facilities, would be subject to additional NEPA assessment (subsequent tiers). As noted in Chapter 1, that assessment would include public scoping, review, and comment.

Issues

- The short and long-term employment, income, and population/migration related to the construction and operation of the future facilities, including the groundwater production wells.
- Demand for short-term and permanent housing during construction and operation of the future facilities.
- Demands on and potential risks to local infrastructure and public facilities and services, including municipal/public water systems, associated with construction and operations of future facilities, groundwater pumping and drawdown.
- Potential indirect effects of groundwater drawdown on the viability of local agriculture and on resources affecting tourism and outdoor recreation.
- Potential indirect effects on agricultural activities outside of the region due to loss of agricultural outputs from the region.
- Potential direct and indirect fiscal effects related to groundwater production and drawdown.
- Potential effects on social organization and conditions associated with the development and operation of the groundwater production fields and drawdown.
- The potential for further fragmentation of the agricultural community if "wheeling", a fee-based arrangement for the transport of non-SNWA water through the main pipeline, beyond the current contractual obligations with the LCWD, is allowed.
- Potential indirect effects of groundwater production and exportation on long-term economic development prospects in rural areas, particularly White Pine County.
- Concern that urban attitudes towards the project discount effects on locally affected populations in the rural areas.
- Potential direct and indirect effects of groundwater production fields and drawdown on property/real estate values and related fiscal effects.
- Effects of groundwater drawdown on quality of life, lifestyle, and long-term cultural heritage.
- Concerns regarding potential indirect effects of drawdown on air quality and other environmental resources contributing to quality of life effects, particularly for Utah residents and communities along the Wasatch Range.
- Potential effects of future facility development, production, and drawdown on low-income and minority populations.
- Potential effects of climate change on socioeconomic conditions.

Controversy Regarding the Projected Need for Additional Water Supply

A subject of intense public interest and comment to the Draft EIS was the projected need for the additional water in the Las Vegas Valley, particularly given the continuing effects of the economic recession, and the associated uncertainty created regarding the timing and scale of future growth. Although of interest to many, that subject is not within the scope of BLM review for the decisions based on this EIS in response to SNWA's ROW application (See Chapter 1).

Assumptions

- The assessment uses programmatic assumptions regarding the development timing of production wells, with such timing consistent with the groundwater pumping scenarios.

- The assessment uses programmatic assumptions regarding the direct employment requirements associated with the development of production wells and the associated access roads, power lines, collector pipelines, and other facilities.
- Programmatic assumptions are made regarding the development of one or more temporary construction worker camps as to location, period of use, and range of services provided.
- Potential short-term and long-term indirect effects of project ROWs and facilities on grazing are addressed based on the range resources assessment conducted for this EIS.
- Potential short-term and long-term indirect effects of project ROWs and facilities on public recreation are addressed based on the recreation assessment conducted for this EIS.
- Indirect potential for disproportionate and adverse effects on Native American populations are addressed based on the cultural and Traditional Native American Values assessments conducted for this EIS.
- Potential long-term effects on local agricultural production reflect projected groundwater drawdown effects in the areas with irrigated pasture and croplands.
- Only water owned by the SNWA or conveyed on behalf of the LCWD would be transported through the pipeline, i.e., the SNWA would not engage in "wheeling" – the provision of transportation capacity to other parties on a 'for fee' basis. Note that the BLM has no authority over this facet of pipeline operations.
- The NSE's estimates of current appropriated use and sustainable yield that underlie the recent ruling in Spring, Delamar, Dry Lake, and Cave valleys are reasonably accurate, and thereby provide a reasonable assurance of continued use by valid, existing water rights.
- The COM Plan (see Section 3.20, Monitoring and Mitigation Summary) is fully implemented and groundwater development system implementation proceeds and operates as proposed.
- Assumptions about the potential changes in future groundwater availability from groundwater pumping do not incorporate additional assumptions about the effects of climate change because specific long term effects of climate change presently are not known, and the incremental contribution of climate change effects to project effects cannot be reasonably estimated. A discussion of climate change effects is provided in Section 3.18.3.
- SNWA would be required to develop and implement a comprehensive COM Plan that would include all future hydrographic basins and all facilities associated with the SNWA GWD Project. The COM Plan includes a requirement for comprehensive monitoring and mitigation program for the entire project that would integrate the various required monitoring and mitigation activities. The COM Plan would integrate protective measures from the following: BLM RMP management actions and BMPs, BO, ACMs, stipulated agreements, and additional mitigation recommended in the EIS.

Methodology for Analysis

The primary drivers of future socioeconomic impacts associated with future facilities are: 1) the number and location of groundwater production wells; 2) the number of construction workers employed on the project and duration of that employment; and 3) the areal extent, timing and magnitude of groundwater drawdown on the region's environmental resources and the risks such drawdown poses to economic resources and social conditions. Construction of the future facilities would result primarily in short-term effects, whereas drawdown related effects would be long-term, materializing and increasing over time. Unlike many natural resource impacts which occur within or adjacent to the ROW corridors and in the groundwater production basins, social, and economic effects also would occur in the surrounding communities and along the major transportation access routes.

The timing, duration, and location of construction activities are important parameters in the assessment. SNWA's project schedule calls for construction activity on the main pipeline and ancillary facilities to begin in year 1, with completion by year 12 (SNWA 2011). Development of groundwater production wells and collector systems is scheduled to coincide with the availability of conveyance capacity in a particular groundwater production basin. Thus, exploration drilling and production well development would begin in Delamar Valley and progress northward. Well development activities are assumed to continue year-round and could involve the deployment of multiple drilling rigs that move to new locations as wells are completed. After wells are tested and found to be suitable for use as production

wells, other construction crews would install the necessary pumps, collector pipelines, power lines, and other facilities. Seasonal wildlife stipulations could preclude activity in specific locations during certain periods.

The SNWA's anticipated groundwater needs would influence the well development schedule. Pumping assumptions defined as part of the groundwater modeling conducted for this EIS portray a multi-phase schedule to produce and convey water to the Las Vegas Valley to meet the SNWA's demand projections, assuming continued availability of Colorado River water. Under those assumptions, future production in Snake Valley is not envisioned to achieve full production quantities until around the middle of the century. Drought, affecting water availability from other sources, could accelerate the development of the future facilities and onset of water production, up to quantities approved by the NSE and subject to any conditions contained in other agreements.

Construction of the future facilities under the Proposed Action or Alternatives would not have substantial direct effects on long-term population or economic growth in the region. No substantial long-term effects on the region's economic and social resources and structure are foreseen in conjunction with the maintenance of the future facilities and the associated operation of the pipeline. Long-term effects, to the extent that they would occur, are discussed in Section 3.18.2.8.

Potential project-related social and economic effects of groundwater drawdown are assessed based on review of projected drawdown areas and range of drawdown for each alternative considering existing land use and economic activities within those areas and the social and economic linkages to the broader assessment area. The social assessment includes a review of current and historic attitudes and opinions toward groundwater pumping and drawdown, associated social effects for each affected public in the rural and metropolitan parts of the assessment area, and potential future effects based on the location, timing and extent of projected groundwater drawdown.

The relationship between groundwater production and conveyance and its role in enabling future growth in the Las Vegas metropolitan area is included in the discussion for the Proposed Action.

Future Facilities development and pumping profiles would be unaffected by the Alignment Options. Therefore, the Alignment Options are not addressed in this section.

Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

Section 3.18.3, discusses the potential effects of climate change on socioeconomic resources in the region. Climate change-related effects could occur in the same time frame as those related to the groundwater development pumping. However, given the current scientific knowledge regarding climate change, its potential implications on a regional/localized level, and the timing of future changes, it is not possible to relate potential effects associated with climate change to those related to specific pumping alternatives analyzed in this Final EIS.

3.18.2.9 Proposed Action

Groundwater Development Areas

SNWA is planning to conduct exploratory drilling in each groundwater basin in which the NSE grants it water rights. The results of that drilling program will be used by SNWA to determine the number and location of production wells to be developed. SNWA anticipated between 144 and 174 production wells, yielding a maximum annual production of 176,555 afy. Future groundwater production facility development would occur in 4 periods: years 5 thru 8 in Delamar, Dry Lake, and Cave valleys; years 14 thru 16 in southern Spring Valley; years 31 thru 33 in northern Spring Valley; and years 36 thru 38 in Snake Valley. These assumptions are consistent with the assumptions regarding the initiation of pumping and water conveyance used in the groundwater modeling performed for this project (see Section 3.3, Water Resources). Under these assumptions, SNWA plans its capital investment associated with future facilities development based on projected need, but would be at risk of short-term constraints on water availability until the remaining proposed production wells are completed.

The assumed development schedule for future facilities in Delamar, Dry Lake, and Cave valleys implies concurrent development with construction of the latter phases of the Proposed Action in northern Lincoln County. Such concurrent

development could exacerbate short-term demands on housing and public services in the area. Development of future facilities in Spring and Snake valleys would occur years after the completion of construction of the Proposed Action.

Each phase of groundwater production well field development would result in a series of short-term construction and development activities. Construction employment, including the indirect and induced effects, for the future facilities would average about 137 jobs for 4 years during development in Delamar, Dry Lake, and Cave valleys; 125 jobs for each of the two 3-year development phases in Spring Valley; and 105 jobs when development occurs in Snake Valley (**Table 3.18-35** and **Figure 3.18-11**). Approximately 60 percent of these short-term jobs would be directly associated with well field development. Each period of future facility development would be characterized by a temporary population influx into nearby communities, the extent of which reflects the number of non-resident workers employed by the project and those supported indirectly by the project. Given the rural nature of the groundwater development areas, this analysis assumes that Clark County residents could fill approximately 35 percent of the direct, indirect, and induced jobs associated with future facilities, with residents of the rural areas filling another 35 percent, and non-locals temporarily relocating to the area filling the remaining 30 percent.

Table 3.18-35 Short-term Employment Effects, Future Facilities Development for the Proposed Action

	Delamar, Dry Lake, and Cave Valleys	Spring Valley	Snake Valley
Number of Production Wells	Up to 33 total	Up to 93 total	Up to 48
Timing of Exploratory Drilling	Year 4	Years 9 thru 11 (South) Years 27 and 28 (North)	Years 32 and 33
Timing of Production Well and Collector Pipeline Development	Years 5 thru 8	Years 14 thru 16 (South) Years 31 thru 33 (North)	Years 36 thru 38
Temporary Employment Effects – Average			
Direct employment	82	75 per phase	63
Indirect/Induced Jobs[1]	55	50 per phase	42
Total Temporary Jobs, Future Facilities	**137**	**125 per phase**	**105**

[1] Based on a jobs multiplier of 0.67 indirect and induced jobs per direct job.

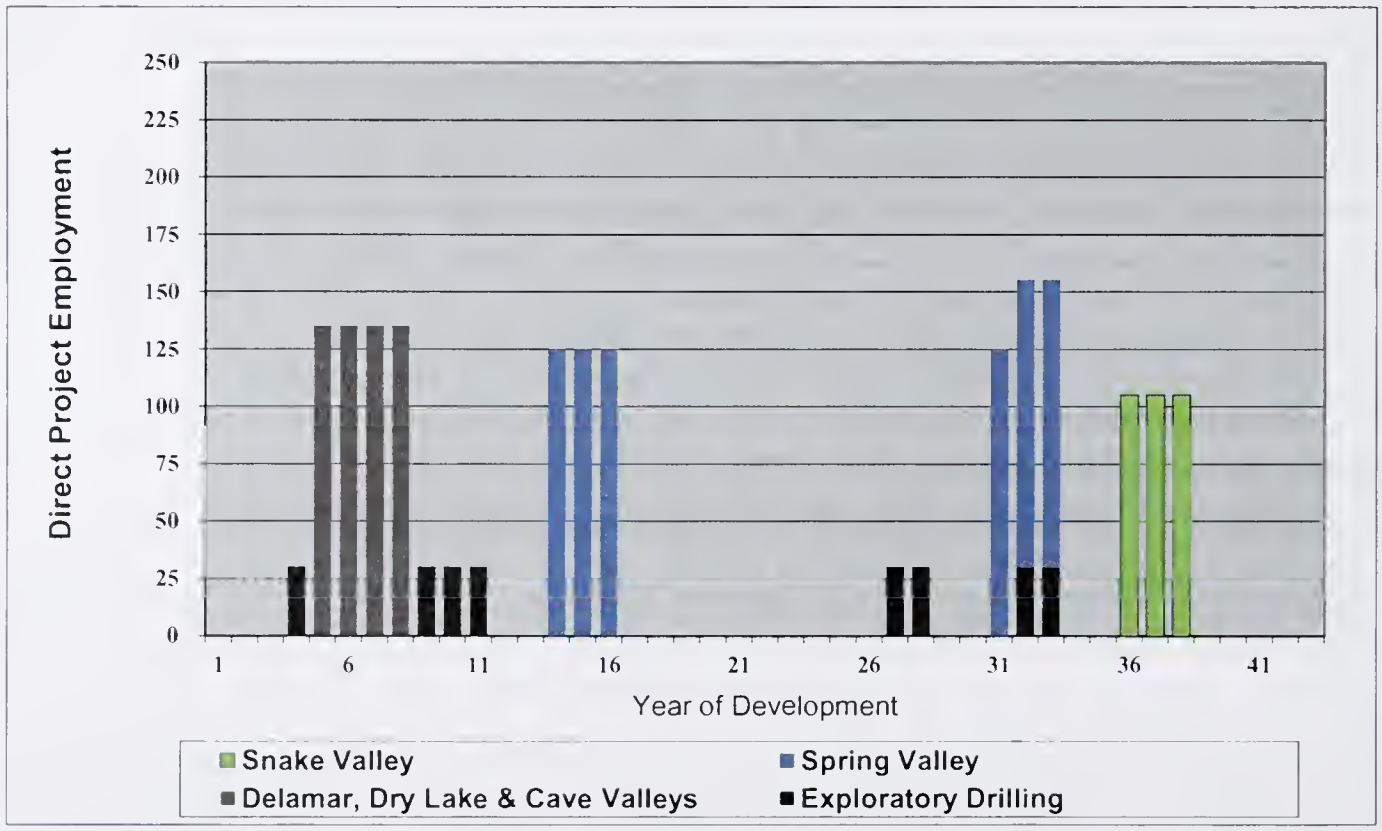

Figure 3.18-11 Direct Short-Term Employment - Future Facilities Development Associated with the Proposed Action

Caliente, Panaca, and Pioche may experience concurrent temporary economic and social effects, including demands on temporary housing and public facilities and services from pipeline construction and exploratory drilling and future facilities development in the Delamar, Dry Lake, and Cave valleys. Such effects could occur in years 3 thru 6.

Communities affected by the temporary population influx would likely experience a larger presence of workers on weekdays than on weekends because some non-local workers would return home on weekends and holidays. The estimated short-term population effects arising in conjunction with production well field development in the Delamar, Dry Lake, and Cave valleys, range from 77 on weekends to 155 on weekdays, affecting primarily communities in Lincoln County. Comparable temporary population effects would be associated with each phase of future facility development in Spring Valley. The short-term incremental population impacts associated with future facility development in Snake Valley would be lower, ranging from about 140 during the workweek to 80 on weekends (**Table 3.18-36**).

Table 3.18-36 Short-term Population Effects, Future Facilities Development for the Proposed Action

	Delamar, Dry Lake, and Cave Valleys	**Spring Valley**	**Snake Valley**
Timing of Produetion Well and Colleetor Pipeline Development	Years 5 thru 8	Years 14 thru 16 (South) Years 31 thru 33 (North)	Years 36 thru 38
Total Temporary Jobs, Future Faeilities - Average	137	125 per phase	105
Incremental Temporary Population			
Weekdays[1]	155	140 per phase	119
Weekends[2]	77	80 per phase	66
Temporary Housing Demand (Units)	91	83 per phase	69

[1] Weekday population would depend on the locations of indirect and induced jobs supported by future facilities development.
[2] Assumes 1.5 persons per each non-resident worker.

The economic and population influx associated with future facility development would result in other effects on social and economic conditions. Most of these would be temporary, dissipating quickly after well field development is completed and the nonlocal workforce has left the area (**Table 3.18-37**).

Table 3.18-37 Socioeconomic Effects, Future Facilities Development for the Proposed Action

- Construetion of the future faeilities would direetly and indireetly generate an estimated $100 to $150 million in additional personal ineome in the region over the eourse of the 4 phases of development.
- Inereased demand for general government serviees, e.g., the eounty elerk, and on eounty and munieipal utilities, would generally be modest in Clark and White Pine counties. Publie services and facilities in Lineoln County may be affeeted eoneurrently by demand assoeiated with pipeline and transmission line eonstruetion and exploratory drilling and future faeility development.
- The NDOT, eounty road and bridge departments, and the BLM eould experience inereased road maintenanee demand.
- Demand for temporary housing is estimated at 91 units in eonjunetion with the Delamar, Dry Lake, and Cave valleys phase of the future faeilities, 83 units for the 2 Spring Valley phases, and 69 units with the Snake Valley phase.

  The total need ineludes demand for RV parking/hookups and motel rooms for non-resident workers who would return to their homes on weekends.

  A segment of the housing demand assoeiated with indireet and indueed jobs would be loeated in Ely, Las Vegas, and other eommunities that are removed from the immediate development area.
- Motels, hotels, RV eampgrounds, and other temporary housing resourees in Clark and Lineoln counties, including new resourees developed to serve the temporary demand from the Proposed Aetion, and those within reasonable eommuting distanee from the job sites, eould aeeommodate much, if not most of the temporary demand.
- Depending on the timing of exploratory drilling and future faeilities development, the short-term housing demand assoeiated with the Delamar, Dry Lake, and Cave valleys phase of the future faeilities may support eontinued operation of a temporary eonstruction worker faeility in eentral Lineoln County, should sueh a faeility have been developed for the Proposed Action and still be operational.

Table 3.18-37 Socioeconomic Effects, Future Facilities Development for the Proposed Action (Continued)

- Short-term housing impacts in Baker/Snake Valley could be acute, depending on the availability of temporary housing at the time and level of seasonal tourism demand associated with nearby GBNP and other recreational, scenic and historic attractions in the area. Local business establishments would benefit from the additional demand and spending, although the competing demands may also give rise to additional social conflict.
- Temporary population influxes from the project would increase demand and pressure on local law enforcement/criminal justice, emergency responders, and emergency medical care capabilities. The increased demands would occur over a period of years, shifting location as the project moves northward.
- Law enforcement coverage is stretched over the vast geographic area and most of the emergency medical and fire responder network consists of community-based volunteers. Thus, responses to project-related needs may be lengthy and would reduce coverage and increase response time to residents in the event of another call concurrent with the first. Given the small scale of future facilities construction, law enforcement and emergency response demands are likely to be modest.
- Based on SNWA's preliminary project development costs, purchases of materials and supplies used in the construction of the future facilities would generate an estimated $11 to $14 million in state and local sales and use taxes. The state general fund, public education, and governments would benefit from such taxes. The distribution of revenues would depend on where a vendor is licensed to do business, i.e., out-of-state versus in-state. Having major vendors establish a place of business in Lincoln and/or White Pine counties can increase the share of sales and use tax revenues accruing in those counties.
- The state and affected county governments would realize increases in sales tax revenue from local retail expenditures by workers and incremental revenues from other taxes, fees, and charges for services.
- Few school-age children are likely to accompany the temporary construction work force.
- Ranchers with grazing permits for public lands may experience temporary reduction in income due to construction related effects on grazing due to loss of forage, diminished quality due to dust, injury or death of livestock, and the requirement for more active management.
- The effects of future facility development on community social and economic conditions would be most pronounced in the Baker/Snake Valley community, due to the level of activity relative to the size of the community, proximity of such development to the community, and the area's remoteness from other communities.

  Snake Valley is the only future facility development area encompassing a community. Consequently, the social and economic effects of future facility development would be more pronounced in the Snake Valley than in other locations, because more people's lives would be directly affected. Moreover, the Snake River Valley communities are relatively stable and socially cohesive, and most of the residents are strongly opposed to groundwater development, which would likely exacerbate conflict and the adverse social effects of future facility development.
- Rural portions of the study area would experience an influx of a single-status, predominately working–age male work force into the existing small, relatively cohesive and stable social settings. Several of the communities have prior, though not necessarily contemporary experience accommodating and adjusting to temporary population influx associated with other construction projects and/or natural resource development.
- Some conflicts in social settings and increases of certain types of crime could occur. Opposition to the project would increase the potential for conflict between residents and individuals working on the project.
- The absence of population in most of the groundwater development areas and absence of high concentrations of minority or low-income populations and Indian Tribes in the inhabited groundwater development areas effectively preclude disproportionately high and adverse future facilities development-related impacts to minority or low-income populations and Indian Tribes; therefore, no Environmental Justice impacts would be anticipated.

Groundwater Pumping

Potential long-term effects of groundwater production and drawdown are generally of greater concern in the rural areas than are the direct effects. Being in a high desert environment, virtually all economic activity in the rural areas is directly or indirectly reliant on groundwater, or on seeps and springs replenished by precipitation occurring in higher elevations of the Great Basin range. The groundwater modeling performed for this assessment produced forecasts of drawdown over an extended (~240 year) time horizon. The pattern and extent of drawdown reflect the timing and volume of pumping, expanding in areal extent and vertical extent/elevation over time. An understanding of the assumptions and results of the groundwater modeling provides essential perspectives for this assessment; see, for example, Chapter 2 and Section 3.3, Water Resources, **Figures 3.3.2-7**, **3.3.2-8**, **3.3.2-30**, **3.3.2-31**, and **3.3.2-32** for graphics displaying summary results for Alternative F.

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Some effects of pumping would have surface manifestations, e.g., changes in flows in springs, seeps, and streams. Although not visible, subsurface effects would also have manifestations bearing on social and economic conditions in the region. For instance, groundwater drawdown poses long-term risks to the existing agricultural sector in the rural areas through short and long-term effects on grazing on public lands, increasing costs of irrigation and well development costs, and changes in stream flows and seeps that serve as livestock water supplies. Long-term drawdown also poses risks to public water systems that rely on groundwater.

Potential social and economic impacts related to the pumping effects are inherently long-term and materializing over time as pumping and groundwater drawdown continue. Pumping in the Snake Valley, for example, is assumed to first begin approximately 40 years after construction begins under the Proposed Action. Forty years is an instant in time from a geologic perspective, yet represents two generations of time from a socioeconomic perspective. Furthermore, due to the natural processes involved (e.g., transition in vegetation and the timing of that transition, effects on wildlife range and/or livestock grazing, hunting, and fishing) the onset and incidence of social and economic effects could materialize much later and at some distance from the groundwater production locations and may continue long-term even if production ceases. Within that paradigm of delayed physical effects resulting in delayed social and economic effects that are not readily reversible or even stabilized, lie two critical dimensions of the pumping effects as they pertain to social and economic conditions: risk and uncertainty. Although the groundwater model simulated effects at discrete points in time and across a wide geographic area, the actual incidence of changes in groundwater would occur continually across the time, and the timing and location of effects within a given area are unknown. Individual property owners, even those in relatively close proximity to one another, could be affected differentially due to geologic conditions, specific well locations, existing well depths and the productive groundwater zones being pumped.

Table 3.18-38 summarizes the foreseeable and potential impacts on social and economic conditions associated with pumping effects under the Proposed Action. In most instances, the effects on social and economic conditions are 3rd in nature, indirect consequences, or responses to long-term drawdown.

Table 3.18-38 Socioeconomic Effects Associated with Long-Term Pumping with the Proposed Action

- Socioeconomic effects of declining groundwater levels could include:
  - Higher future water well development and pumping costs for individual property owners in and near the groundwater development areas that use private wells for domestic water. Such effects could affect quality-of-life, cost-of-living, property values, or potentially even the continued inhabitability of an individual property.
  - Increased pumping and irrigation costs for farms and ranches, resulting in lower agricultural output, lower income, lower land value of farms and ranches from agricultural pursuits, availability of credit financing, and diminished long-term financial viability of agricultural operations.
  - Drawdown could affect availability and cost of water for livestock, potentially affecting farm and ranch income adversely.
  - Some landowners, principally those having senior surface or groundwater water rights, could see an increase in market values based on the value of water.
  - Long-term subsidence affecting rural residential development and farm operations, e.g., structural damage to buildings, functioning of irrigation equipment, drainage, fencing, in some cases occurring gradually over time.
  - Long-term subsidence directly or indirectly affecting industrial development in the rural areas, e.g., actual or potential subsidence affecting site suitability for wind energy development from a geotechnical perspective.
  - Customers of the Baker public water system could experience higher water rates over time; the result of higher pumping costs.
  - Potential long-term county fiscal effects due to changes in property values.
  - Indirect effects of declining groundwater levels on social and economic conditions would generally be a function of the level of drawdown and risks to surface water resources (see Section 3.3, Water Resources).
- Socioeconomic effects associated with impacts on surface waters could include:
  - Effects on fish and wildlife, potentially affecting fishing, hunting, and other outdoor recreation.
  - Effects on existing domestic use, either by reducing localized recharge, availability for surface application, or non-consumptive use. Such effects could affect the cost-of-living, the quality-of-life, and property values.
  - Effects on water used by livestock, potentially affecting farm and ranch income adversely.

Table 3.18-38 Socioeconomic Effects Associated with Long-Term Pumping with the Proposed Action (Continued)

- Socioeconomic effects associated with impacts on vegetation could include:
  - Adverse impacts on ranch income and ranch values due to changes in forage type and availability, potentially affecting grazing on public lands, increasing the costs for hay from private lands and/or leasing pasture.
  - Changes in vegetation types affecting forage for wildlife, including big game species, which could potentially affect hunting and other outdoor recreation, e.g., wildlife watching.
  - Potential reductions in the production and availability of some nuts, berries, and plants within the areas affected by drawdown – primarily the valley floors.
- Socioeconomic effects associated with impacts on wildlife populations could include:
  - Long-term reductions in hunting, fishing, and wildlife watching, with reductions in recreation expenditures in communities
- Socioeconomic effects associated with increases in airborne dust/reductions in air quality could include:
  - Reduced palatability of forage, adversely affecting wildlife populations and livestock grazing.
  - Effects on air quality and visibility in communities within and downwind from the assessment area.
  - Effects on general visibility and night-skies that may adversely impact tourism, including visitation to GBNP.
- Potential long-term socioeconomic effects arising from other factors, either individually or in concert with one or or more of the above factors:
  - Effects contributing to changes in the quality-of-life of current and future residents of the area and non-residents who have established ties to the area, e.g., repeat visitors to GBNP and other locations in the Great Basin.
  - Decisions by some residents, or future descendants of current residents, drawn to the area for it remoteness and unique setting, to leave. Limited opportunities to relocate to a comparable setting exist.
  - Uncertainty regarding water supplies as groundwater levels drop, potentially discouraging residential subdivision and investment, retirement and lifestyle migration to the area, and other forms of economic development
  - Disincentives to future investment and economic development in some rural areas, including development on public lands identified for potential disposal in the Ely RMP.
  - The long-term uncertainties regarding groundwater availability, farm income, quality-of-life, and property values could gradually reduce the amenity value associated with the rural lifestyle that attracts and holds some residents to the area.
- There are an estimated 24,600 acres of private agricultural lands in Spring and Snake valleys, approximately 75 percent of which are in Snake Valley.

  The groundwater simulations indicate that 64+ percent of the total (15,792 acres) would be affected by vertical drawdown in excess of 10 feet at the end of the full build out plus 75 year time frame; approximately 115 years following the initiation of construction.

  Of the affected lands, nearly 6,100 acres overlie areas having projected drawdown of 20 to 49 feet, with nearly 8,600 additional acres overlying areas with projected drawdown of 50 to 99 feet – see the following table.

Acres of Private Agricultural Lands Affected By Long-Term Drawdown, Proposed Action

Private Agriculture Lands	Spring Valley			Snake Valley			Combined Total			
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out Plus 200 Years
	6,111 acres			18,489 acres			24,600 acres			
Drawdown Interval	Acres Within Interval			Acres Within Interval			Acres Within Interval			% of Total
Unaffected to <10'	4,905	1,405	931	18,489	7,403	6,477	23,394	8,808	7,408	30.1%
10' - 19'	1,206	866	949	-	265	891	1,206	1,131	1,840	7.5%
20' - 49'	-	3,083	1,023	-	3,014	890	-	6,097	1,913	7.8%
50' - 99'	-	757	2,562	-	7,807	5,257	-	8,564	7,820	31.8%
100' - 200'	-	-	646	-	-	4,973	-	-	5,619	22.8%
200' or more	-	-	-	-	-	-	-	-	-	0.0%
Total Affected	1,206	4,706	5,180	-	11,086	12,011	1,206	15,792	17,192	69.9%
% of Total	19.7%	77.0%	84.8%	0.0%	58.8%	63.7%	4.9%	64.2%	69.9%	-

Table 3.18-38 Socioeconomic Effects Associated with Long-Term Pumping with the Proposed Action (Continued)

- The combined area of private agricultural land affected by drawdown of 10 feet or more increases to 17,192 acres when the groundwater pumping simulation is extended to full build out plus 200 years. Furthermore, the severity of the drawdown effects increases such that the areal extent of agricultural lands affected by drawdown of 50 feet or more increases to 13,439 acres, nearly 54 percent of all private agricultural lands in the Spring and Snake valleys.
- Energy use and costs related to irrigation and domestic use increase as pumping depth increase. As the level of drawdown increases, well owners face higher costs associated with installing additional impellers, larger pumps, and/or drilling and equipping new replacement wells. The latter would involve additional capital investment, with no assurances that a new supply could be developed, and higher operating costs if successful. Yet another scenario could involve a new well producing a lower quantity of water. Either scenario may result in the amount of land irrigated and lower crop or livestock production. Because farmers and ranchers operate in a market place that restricts their ability to pass on higher costs to their consumers, these changes would lower farm income,

  Farm income would also be reduced as an indirect effect of reductions in herd size associated with changes in forage for grazing on public lands, or due to changes in transportation and/or feed costs to replace lost forage with private pasture or feed.

  Any reductions in farm income would effectively limit the ability of many farmers and ranchers to afford the capital expense associated with deepening a well, installing new pumps, or drilling and completing new wells.

  Reductions in farm income and profitability generally would reduce the market value of farms and ranches, when valued from a capitalized income approach. The combination of lower current income and market value of affected farms and ranches would adversely affect the ongoing economic viability of agriculture operations.
- Some property owners affected by drawdown may pursue and receive compensation through various mitigation programs or legal avenues.
- Diminished value of agricultural lands could adversely affect local government revenues and any long-term loss of population in rural counties could adversely affect intergovernmental revenue transfers and PILT.
- Potentially higher value of some private lands, particularly those with senior water rights, may occur after the pipeline is completed. Farm and ranch owners affected by drawdown may have an opportunity to sell at premiums over established agricultural land values because of the export capacity created by the pipeline.
- Decisions to suspend agricultural production operations, may result in other long-term changes in land use, for instance, a decision by an owner to reserve a portion of their water rights for subdividing their lands for rural residential/"horse properties" and selling the remaining water rights.
- Long-term losses of agricultural production from the rural counties associated with groundwater drawdown and increases in production costs could have long-term indirect impacts on suppliers and customers; as an example, other ranchers and feedlots that purchase hay produced in the Snake Valley would need to find alternative sources of feed or cut back on the numbers of animals fed.
- Effects of groundwater drawdown could threaten the long-term viability of agriculture in the Snake Valley, and thereby the broader Snake Valley community by diminishing the economic support for the already limited retail and service base in and around Baker. Losses sufficient to result in closure of one or more establishments would in turn adversely affect the availability of services to support staff and visitors at the GBNP who rely on those establishments for some essential goods and services and could affect the quality of life for GBNP staff and other residents of the area.
- Merchants, professional and personal service providers, and local governments in Ely, Delta, Panaca, Pioche, and Caliente also could be affected by reduction in local farm and ranch income.
- Projected long-term groundwater drawdown would occur under 5,399 acres of public lands identified for potential disposal in the Ely RMP. Approval of the GWD Project, with its potential implications on drawdown and water availability could have adverse effects on the value of those lands for community development, the likelihood of disposal, and associated effects on the BLM in terms of management.
- The transfer of groundwater produced from White Pine and Lincoln counties to Clark County under the Proposed Action would generate up to $1.77 million annually in interbasin water transfer fees under N.R.S. 533.438; the amount would vary in response to the actual quantities of water conveyed and assumes that Lincoln County would waive such fees for intra-county transfers of water conveyed in the pipeline. Proceeds from such fees are to be deposited in a trust fund, the balance of which must be used for economic development, health care, and education.
- Completion and operation of the pipeline under the Proposed Action could allow SNWA to convey an additional 8,000 afy of groundwater that is presently produced for agricultural use in White Pine County. Up to $80,000 per year in additional interbasin water transfer fees would result from such transfers.

Table 3.18-38 Socioeconomic Effects Associated with Long-Term Pumping with the Proposed Action (Continued)

- The interbasin transfer fees would be distributed between Lincoln and White Pine counties in pro rata share to the quantity of water produced from each county. The distribution shares are subject to review and approval by the NSE, taking into consideration the likely source of water in hydrographic basins located in two or more counties.
- Any future purchases of private property by the SNWA, to obtain additional water for use in environmental mitigation or to compensate current owners for adverse effects on agricultural operations, would remove additional property from the local property tax base.
- The real and perceived effects of groundwater drawdown may constrain long-term economic development and diversification in the rural areas, by limiting investment in second and retirement homes, discouraging lifestyle migration, and hampering new business recruitment.
- The recent NSE decisions granting water rights to SNWA in four of the five water production basins do reserve some water for future needs in each basin. The reserved amount in Spring Valley could support additional residential development and certain types of commercial and industrial development.
- The granting of up to 61,000 afy in water rights for SNWA precludes the availability of that quantity of water to support a more water-intensive use in Spring Valley, or elsewhere in White Pine County, although as noted in the NSE's ruling, any prospects for such use are speculative at this time.
- White Pine County's efforts to recruit and support renewable wind energy production facilities in Spring Valley would likely be an affected due to water availability because the NSE typically approves short-term use to support construction.
- Long-term effects of groundwater drawdown include surface subsidence within the production areas with the extent of long-term subsidence generally correlated to the level of drawdown. Potential effects of subsidence include damage to roads and highways, fences, structures (e.g., cracked walls and foundations), and buried utility systems. Potentials for damage would be highest in the Snake Valley due to the density of and proximity to development, given that the most severe drawdown outside of Snake Valley would occur in uninhabited or lightly settled areas. (See Section 3.2, Geologic Resources, for additional discussion of subsidence risks).
- A major accident or structural failure involving the pipeline or transmission line, particularly at or near a crossing of a major regional highway, would impact local law enforcement and other first responders and potentially disrupt highway traffic. Depending on the location and severity, such a disruption could result in substantial economic costs, inconvenience to the traveling public, and fiscal effects on the responding agencies.
- Long-term effects on population, employment, labor force, and economic structure stemming indirectly from groundwater drawdown would have corollary effects on social organization and conditions in the affected communities, which could include continuation of existing project-related attitudes, opinions, and associated social effects including political conflict, social dissension, community discord, and personal distress.
- Social and economic effects would stem from manifest effects, perceived risks and benefits of the GDW Project for the various affected parties and could in turn affect local population, economic, and employment conditions.
- Project construction followed by the onset of groundwater pumping, would cause increasing distress for many residents of the rural portion of the assessment area. Distress would stem from their perception of the risks of damage to the physical and biological environments and associated concern for detrimental long-term effects on their health, quality of life and livelihoods, and those of their children, grandchildren, and successive generations. For some residents of the rural assessment area, particularly those in Snake and Spring valleys, personal distress would stem from the risk of loss of a valued rural way of life.
- Some residents, organizations, and community leaders in Lincoln County may view the benefits of the Proposed Action groundwater pumping and future residential and commercial development and other economic activities, as partially or wholly offsetting the potential social and economic risks of groundwater drawdown.
- For some Las Vegas Valley residents, organizations, community and political leaders, and development interests, initiation of groundwater pumping may provide a measure of assurance that water will be available to enable growth in the Las Vegas Valley and provide a buffer against future water shortages due to episodic drought or climate change.
- Residents of the Las Vegas Valley are likely to remain divided on their support for the groundwater development project because of the implications of continued growth in the Las Vegas Valley for the areas' environment and quality of life, concern about the project's cost, and concern about the equity and environmental consequences of groundwater pumping for the rural areas.
- Some residents of communities located downwind from the affected areas would be concerned about potential indirect effects from long-term pumping on air quality.

Table 3.18-38 Socioeconomic Effects Associated with Long-Term Pumping with the Proposed Action (Continued)

- The drawdown associated with groundwater production would generate long-term adverse social and economic effects in the rural areas. However, these effects would occur throughout the socioeconomic study area and would be unlikely to result in disproportionately high and adverse impacts to a minority or low-income population or Indian Tribes.
- A key concern among tribal representatives participating in the government-to-government consultations was the potential for groundwater development to affect the springs and streams in and adjacent to the basins in which pumping would occur. **Table 3.3.2-6** describes potential reductions in spring and stream flows forecast to occur under the Proposed Action. Such flow reductions could affect Native American traditional values, but the extent and manner of such effects are not known. Also unknown is the extent to which the strategies recommended to address the effects of pumping on surface water (see **Table 3.3.2-6**) would alleviate, reduce, or avoid potential effects on Native American traditional values. With respect to effects on Native American traditional values, the CEQ environmental justice guidelines do not identify thresholds, scales, or appropriate comparisons to determine whether the effects on such traditional values would have an adverse impact on affected Indian Tribes that would exceed those effects on the general population.

Operation of the groundwater production fields are included in the effects associated with operation of the Proposed Action, with up to 20 SNWA staff positions. Those jobs would represent long-term beneficial effects of the Project. The low number of direct long-term jobs associated with the project would translate to limited effects on total employment, unemployment, personal income, resident population and demographics, housing demand, and on public facilities and services. The scale of projected growth would be insufficient, in and of itself, to require additional public sector staffing or facility capacity, although the growth could contribute to needs arising from other sources.

Relationship of the GWD Project to Potential Growth Inducing Effects

CEQ Regulations for Implementing the Procedural Provisions of the NEPA contain the following regarding the effects to be addressed in an EIS:

> "Effects include…(b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." (40 CFR1508.8)

CEQ Regulations provide no specific guidance on how to identify or assess the potential for growth inducing effects. Direct, indirect, and induced employment associated with the Proposed Action would result in short term-temporary growth in the affected counties and communities during construction and limited long-term growth during project operations and maintenance. Construction, operation, and maintenance of future facilities would have similar growth effects.

Direct Population and Economic Growth Effects of the Proposed Action and Alternatives

The Proposed Action and Alternatives would result in temporary population growth during construction of the pipelines, pumping stations, regulating tanks, electrical power lines, electrical substations, the water treatment facility, and the underground water storage facility. Construction-related growth effects are anticipated to be short-term and temporary and would occur primarily in Lincoln and White Pine counties, although some secondary economic and employment benefits would occur in the Las Vegas Valley and elsewhere in the state and nation. Many construction workers would be anticipated to be drawn from the resident Clark County workforce and therefore, would generate little, if any, growth effects in that county. Long-term direct growth effects associated with the operation and maintenance of these facilities would be minimal and would occur primarily in Lincoln and White Pine counties. Section 3.18.2 above describes the potential direct employment and population effects associated with construction, operation, and maintenance of Proposed Action-related water conveyance facilities. Construction-related growth effects of the water conveyance facilities would vary somewhat in location and timing, depending on the alternative, but growth effects of operation and maintenance of water conveyance facilities would be similar across all pumping alternatives.

Indirect Population and Economic Growth Effects of the Development of Future Facilities

Indirect effects, similar to those associated with construction and operation of the water conveyance facilities, would occur, during construction, operation, and maintenance of the future facilities including groundwater production wells, water collection pipelines and power facilities. Development-related population effects of future facilities would be temporary and occur primarily in Lincoln and White Pine counties. Operations and maintenance effects would be minimal but long-term in nature and again occur primarily in Lincoln and White Pine counties although secondary economic and employment benefits would occur in the Las Vegas Valley and elsewhere in the state and nation. Future facilities construction-related growth effects would vary somewhat in location and timing, depending on the alternative, but growth effects of operation and maintenance of future facilities would likely be similar across all action alternatives.

Indirect Growth Effects of Groundwater Production and Conveyance

Another series of long-term indirect effects of the Proposed Action and alternatives – the long-term production and conveyance of water to the Las Vegas Valley and portions of Lincoln County – could function in conjunction with other factors to enable future population growth anticipated by Clark County, Lincoln County, and their municipalities. Indirect effects of groundwater conveyance and of groundwater production would vary across the rural counties and the Las Vegas Valley. Growth associated with groundwater production would not occur in White Pine County and in parts of rural Lincoln County; in fact, groundwater production could result in population loss in these areas if declining groundwater levels resulted in reductions in farm and ranch profitability and adverse effects to vegetation, wildlife, and natural features that support tourism and recreation visitation.

Indirect growth-related effects of water conveyance and groundwater production would include the role of additional water resources in enabling growth in the Las Vegas Valley and parts of Lincoln County. The availability of water would not by itself induce growth in those areas, as has been demonstrated by the recent recession related effects in the Las Vegas Valley and by Lincoln County's history of modest population growth and decline over the recent decade, periods when these areas were not constrained by water availability.

The Las Vegas Valley. Growth in the Las Vegas Valley in the decades prior to the current economic recession was driven primarily by domestic and international trends in leisure activities, lifestyle migration, attraction of corporate support operations for major national and international firms, and local commercial, residential, and community infrastructure development strategies and actions to attract and support visitors, migrants, and economic development. Additional water is a necessary resource to support growth and development in the Las Vegas Valley if growth trends associated with those or other economic drivers resume in the future. However, while a lack of water would be a constraint to growth, water availability, in and of itself, would not be the underlying cause of future population or economic growth. Rather the impetus for growth would result from other market forces, most of which are outside the region and local influence.

SNWA's objectives for the development of groundwater resources in central Nevada are to diversify its available water resources to protect the community from drought and shortage and to help meet projected water demands. In the SNWA's 2009 Water Resource Plan, the forecast demand for its member agencies through 2060 is based on the June 2008 Clark County Population Forecast prepared by the UNLV-CBER. That forecast projects Clark County population to increase from 1,996,542 in 2007 to 3,646,000 in 2035. Those population projections are based on a series of economic, demographic, and migration assumptions.

The UNLV-CBER projections are consistent with those underlying the Clark County Comprehensive Plan (Comprehensive Plan) (Clark County 2008b). Those projections were also endorsed by the Southern Nevada Regional Planning Coalition (SNRPC), which is comprised of elected officials from Las Vegas, North Las Vegas, Henderson, Boulder City, and Clark County (SNRPC 2001). Both of these processes are independent of SNWA's water plan. The use of a consistent set of projections establishes a common framework for local planning efforts.

At present, the amount of groundwater produced from Lincoln and White Pine counties that could be available to support growth is unknown. The number and volume of water rights granted by the NSE, the actual productive capacity of those rights, potential effects of climate change, changes in Colorado River system flows, and the extent to which groundwater from Lincoln and White Pine counties would be used to augment Colorado River allocations to Las Vegas Valley water users are complicating factors in the assessment of the role of transbasin diversions from Lincoln and

White Pine counties in enabling future growth. Obviously, to the extent that conveyed ground water would be used to replace Colorado River water to meet demands from existing users, it would not be available to support future population growth.

As demonstrated by the above, Clark County and the communities in the Las Vegas Valley anticipate substantial long-term growth and development (current forecasts are for the essentially an 83 percent increase in population over 2007 levels by 2035). Given current water supplies the underlying implications of those projections are that Clark County's future water needs are met, that there are no other constraints to growth, and that global, national, and local economic conditions support the fundamental economic growth assumptions underlying the projections. This level of growth would not occur without additional water resources from some source, although again water would enable but not drive growth.

With respect to planning for growth, Nevada statutes charge local governments with managing growth and in the case of the Las Vegas Valley, with maintaining a regional coalition for coordinating efforts to address the effects of growth. Clark and Lincoln counties have met and continue to meet this charge by developing long-range comprehensive and master plans, policies, ordinances, and other mechanisms to identify and manage potential social and environmental effects of the anticipated growth.

Through legislatively mandated local and regional planning processes, local governments in the Las Vegas Valley have developed plans and policies intended to "identify potential effects of growth, and to accommodate growth while protecting natural resources and preserving and improving the quality of life and character of the Southern Nevada Region" (Clark County 2006, SNRPC 2001). Each of the municipalities within the Las Vegas Valley has planning departments and comprehensive or master plans to guide growth and development within their respective boundaries. The SNRPC is responsible for coordinating the efforts of the individual local governments within the Las Vegas Valley to address the effects of growth on a regional basis. In addition, Clark County, through its comprehensive planning process, addresses potential impacts on a variety of specific environmental resources by virtue of its responsibilities regarding the currently undeveloped land and natural resources within its boundaries.

Southern Nevada Regional Planning Coalition. The SNRPC was created to meet the requirements of Nevada statute (NRS 278.02514). The legislative intent for the Nevada Regional Planning[23] statutes states in part that the Legislature recognized the need to … "Address the anticipated needs and demands of continued urbanization and the corresponding need to protect environmentally sensitive areas…" (NRS 278.02521.1(a)). Nevada statutes also require SNRPC to develop a comprehensive regional policy plan "for the balanced economic, social, physical, environmental, and fiscal development and orderly management of the growth of the region for a period of at least 20 years. The comprehensive regional policy plan must contain recommendations of policy to carry out each part of the plan" (NRS 278.02528.1).

Nevada statutes specify that the comprehensive regional policy plan should include "…goals, policies, maps and other documents relating to:

1. Conservation, including without limitation, policies relating to the use and protection of natural resources.
2. Population, including, without limitation, standardized projections for population growth in the region.
3. Land use and development, including, without limitation, a map of land use plans that have been adopted by local governmental entities within the region.
4. Transportation.
5. The efficient provision of public facilities and services, including, without limitation, roads, water and sewer service, police and fire protection, mass transit, libraries, and parks.
6. Air quality.

[23] For counties whose population is 400,000 or more.

7. Strategies to promote and encourage:
   a. The interspersion of new housing and businesses in established neighborhoods; and
   b. Development in areas in which public services are available" (NRS 278.02528.2).

To meet the statutory requirement, the SNRPC developed the Southern Nevada Regional Policy Plan (SNRPC 2001), which includes regional planning guidelines that will be followed by Las Vegas, North Las Vegas, Henderson, Boulder City, Clark County, the Clark County School District, regional and state agencies, and public utilities. These guidelines address:

- Conservation, Open Space, and Natural Resource Protection;
- Population Forecasts;
- Land Use;
- Transportation;
- Public Facilities;
- Air Quality; and
- Infill Development.

In 2006, the SNRPC completed a study titled "Land Use, Transportation, and Air Quality: Model Description, Findings and Recommendations" (SNRPC 2006). The study describes results of the regional effort to develop a computer model, known as the Land Use, Transportation, and Air Quality (LUTAQ) model, for examining the potential effects of changes in land use characteristics, development density, and transportation planning on air quality, traffic congestion, and other quality of life factors. Once developed, the model was used to analyze a range of development strategies being proposed by or discussed among planners in the region.

Key findings of the LUTAQ modeling include the following:

- Continuing to develop land and the transportation system as they currently are being developed, would result in significant increases in traffic congestion and air pollution in the Las Vegas Valley;
- Increasing the density of development without other changes would make things (air quality conditions) worse;
- Reducing average trip distances and number of trips is required for any significant improvement; and
- Increased use of mass transit and alternative modes of transportation is needed to satisfy the policy goals.

A combination approach of densification, mixed use, and transit changes would:

- Keep time in traffic from increasing beyond present levels;
- Consistently maintain air quality within USEPA standards;
- Avoid a slowing in the rate of population growth; and
- Reduce overall costs below the status quo scenario by avoiding the loss of federal transportation subsidies.

Based on the findings of the LUTAQ modeling, the LUTAQ working group noted that significant improvements in traffic, air quality, and other factors would require a combination of strategies. Based on model outcomes and BMPs practices, the working group provided a series of what they considered to be realistic and achievable general LUTAQ policy targets for the SNRPC and its member entities in the Las Vegas Valley. These included increasing housing density, reducing number of and distances for travel trips, increasing the use of mass transit and alternative modes of traffic, and increasing traffic flow.

Clark County Comprehensive Plan. Clark County has prepared, maintained, and implemented a comprehensive plan to comply with the requirements of Nevada statutes (NRS 278.150). Nevada statutes require that the subject matter of the

plan include a plan for the... "conservation, development and utilization of natural resources, including, without limitation, water and its hydraulic force, underground water, water supply, solar or wind energy, forests, soils, rivers and other waters, harbors, fisheries, wildlife, minerals, and other natural resources. The plan also must cover reclamation of land and waters, flood control, prevention and control of the pollution of streams and other waters, regulation of land use within stream channels and other areas required for the accomplishment of the conservation plan, prevention, control and correction of the erosion of soils through proper clearing, grading and landscaping, and protection of watersheds. The plan must indicate the maximum tolerable level of air pollution" (NRS 278.160 (1) (b)).

The Comprehensive Plan includes elements for community growth management and design, conservation, economics, historical properties, economics, housing, population, and Clark County Public Buildings. The Conservation Element contains information and policies for air quality, flood control, land conservation, species protection, water quality, and water resources. The Air Quality section of the Comprehensive Plan Conservation Element contains sections on carbon monoxide, PM_{10}, future air quality issues, and linkages to transportation and land use. The air quality section provides recommendations and includes a Carbon Monoxide State Implementation Plan for Clark County, a Natural Events Action Plan for Clark County, and a PM_{10} State Implementation Plan for Clark County. Comprehensive Plan policies for air quality state that "...development approval should be conditioned on compliance with local, state, and national air quality standards" (CV 1-1.0), and "...to improve air quality to levels necessary to protect public health and improve visual clarity" (CV 1-2.0) (Clark County 2008a, 2007).

Lincoln County. Similar to conditions in the Las Vegas Valley, the availability of additional water could enable growth that is planned for Lincoln County. Through an agreement with SNWA, current and future water resources to be developed by Lincoln County could be conveyed by the Proposed Action water conveyance system. Although current forecasts from the Nevada State Demographer forecast foresee limited population growth in Lincoln County (see **Table 3.18-6**), several major mixed-use developments are planned. If these developments were developed to the maximum approved levels, they could increase Lincoln County population by more than 250,000 (Lincoln County 2008). As with the Las Vegas Valley, conveyed groundwater from the northern part of Lincoln County could enable growth, but other factors such as second and retirement home development, lifestyle migration, and relocation of working individuals who would commute to the Las Vegas Valley would be the major factors driving population growth.

Planning and development in Lincoln County is guided by several plans and development codes. These include the following:

- *Lincoln County Master Plan:* Adopted by the Lincoln County Board of Commissioners in 2007, as authorized by state statute (NRS 278.150), the Master Plan addresses conservation and natural resources, environmental constraints, land use and demographics, population, economic base, housing, public lands, future growth areas, land use designations, transportation, public services, facilities and utilities, law enforcement, fire protection, emergency management, schools, community services, recreation, parks, trails, and tourism. The plan also provides a community plan for the Town of Alamo (Lincoln County 2007a). The master plan has a 20-year planning horizon and anticipates potential population growth of over 200,000 people (Lincoln County 2007a).

- *Lincoln County Development Code:* Adopted in 2001 and revised in 2005, this code was adopted "...in accordance with and in order to further the implementation of the county master plan and such other plans, policies, and studies designed to promote the orderly growth of the county and its communities" (Lincoln County 2005.).

- *Coyote Springs Planning Unit Development Code* and *Toquop Township Planned Unit Development Ordinance*: Although some growth would likely occur in the existing communities, the majority of growth is envisioned in two developments: Coyote Springs, which straddles the Lincoln – Clark County border in the south-central part of the County and the Toquop Township Planned Unit Development located in the southeast corner of the County. This code and ordinance were enacted to address the special circumstances surrounding these projects. Potential socioeconomic and environmental effects of the Coyote Springs development have been assessed by the USFWS in a 2008 EIS (USFWS 2008). The Toquop Township Planned Development is located in the Lincoln County Land Act area and environmental and social effects of development of that specific project have not been addressed although such effects were generally addressed in connection with the sale of that land (Lincoln County 2007b, 2006).

- *The Lincoln County Public Land Management and Use Plan:* Adopted in 1996, this plan establishes policies and provides direction to Lincoln County Government relative to impacts from actions on and near public lands. Over 95 percent of the land area in Lincoln County is administered by federal agencies and the State of Nevada (Lincoln County 1996).

In summary, the Proposed Action and other action alternatives would result in short term-temporary growth during construction and modest long-term growth during project operations and maintenance. Construction, operation, and maintenance of future facilities would have similar indirect growth effects. These effects would vary only slightly between all action alternatives.

The availability of additional groundwater resources in Clark and Lincoln counties, conveyed by the pipeline and facilities associated with the Proposed Action and other action alternatives, could, in combination with other factors, enable a portion of the population growth that is anticipated by those two counties, but only if necessary underlying economic and environmental factors to stimulate growth are in place. Availability of water would not be a driving force for that growth.

Clark and Lincoln counties each have statutory responsibilities for managing growth and have responded by developing long-range comprehensive and master plans, policies, ordinances, and other mechanisms to identify and manage potential social and environmental effects of the anticipated growth. Clark County and the municipalities in the Las Vegas Valley have organized the SNRPC, which has also developed a plan, studies, and models to identify and plan for socioeconomic and environmental effects of the anticipated growth.

Conclusion. Construction and operation of the groundwater production and associated future facilities and subsequent pumping and conveyance of groundwater to Clark County and other locations in Lincoln County (the latter occurring under the terms of a contractual agreement between SNWA and the LCWD) would have a combination of short-term and long-term social and economic effects in the region. The short-term effects would include temporary migration, population influx, housing demand, demands on public facilities and services, and social effects similar to, but smaller in scale and shorter in duration than those associated with construction of the pipeline. The social and economic effects associated with such development in Spring, Delamar, Dry Lake, and Cave valleys would be concentrated in Pioche, Panaca, and Ely. Businesses in these communities would experience increases in business volume similar to that associated with tourism and hunting, but it would extended over a longer period. The presence of the temporary workers may be a source of social conflict and disruption. The short-term social and economic effects of construction would diminish rapidly then effectively cease following the completion of construction.

For some interests in Lincoln County and the Las Vegas Valley, the onset of groundwater pumping would be welcomed as an indication that water resources to provide buffer against drought and accommodate economic and population growth would be available. Other interests would be distressed at the potential for continued growth and development in the Las Vegas Valley at recent levels.

The initiation of groundwater pumping, transbasin diversions, and long-term drawdown would contribute to political conflict, social dissension, community discord, and personal distress as well as a diminished sense of self-determination and anxiety about the eventual detrimental effects on lifestyle felt by many residents of the rural areas. The long-term effects arising from groundwater pumping and drawdown present risks to social and economic conditions in the rural areas, although uncertainty and the long period over which these effects would arise complicate the description and assessment of such effects. Foreseeable impacts include adverse effects of drawdown on local agriculture, outdoor recreation and tourism, and future economic growth and development. Economic development effects likely would be related the perception of the risks of drawdown as well as the actual effects. Potential adverse economic effects including reductions in income and employment in the agricultural and outdoor recreation sectors could generate similar effects in secondary sectors such as retail, service, and government, particularly if these effects resulted in out-migration of population. Any curtailment in future economic development opportunities including second and retirement home development and lifestyle migration would have similar secondary effects. Local governments may experience reductions in revenues from affected industries, which could also result in reductions in service levels. Adverse economic, population, and fiscal effects could in turn generate changes in social organization and community cohesion stemming from out-migration and changes in traditional local industries, occupations, and lifestyles.

ACMs include the following that are pertinent to socioeconomics, planning, and permitting.

- (ACM-A.8.1), (ACM-A.8.2), (ACM-A.8.3), (ACM-A.8.4), and (ACM-A12.1, 2, 3, and 4).

Proposed Mitigation Measures:

The COM Plan would be implemented for all future groundwater development facilities associated with the GWD Project. Although most of the environmental protection and monitoring and mitigation measures do not relate directly to social and economic conditions, they do relate to environmental resources that indirectly affect those conditions and the quality-of-life of residents and visitors to the area. Consequently, to the extent that COM Plan contributes to avoiding or reducing adverse impacts, it would also represent mitigation for social and economic conditions.

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Per guidance provided by the BLM NEPA Handbook (H-1790-1), the following additional mitigation measures are recommended to help avoid, minimize, and mitigate for potential short-term and long-term socioeconomic impacts associated with future facilities development and pumping effects under the Proposed Action:

GW-SE-6: To Provide a Source Of Emergency Financial Assistance and Equitable Treatment of Potentially Affected Ranchers and Public Water Systems that Rely on Groundwater. SNWA would create and fund a mitigation/protection program for holders and users of water rights in Nevada comparable to that proposed for water rights holders in Utah outlined in the draft Nevada/Utah Snake Valley agreement. Examples of future needs include providing funding to provide emergency water or develop a new community water well in case of a project-related impact. Effectiveness: Implementation of this program would be effective in minimizing long-term social and economic effects.

GW-SE-7: To Provide a Source Of Emergency Financial Assistance to Individual Businesses Adversely Affected By Factors Linked to Groundwater Drawdown. SNWA should expand the impact assistance and compensation program to compensate/provide economic relief to individual businesses for losses due to business interruption or other factors that are reasonably linked to groundwater drawdown. Effectiveness: Implementation of this program would be effective in minimizing long-term social and economic effects.

GW-SE-8: To Promote Income Stability and Long-Term Sustainability of Local Agricultural Industry. SNWA should work cooperatively with DRI, University of Nevada - Reno, University of Utah, USDA, and others to assist farmers and ranchers to implement water conservation practices and to transition to higher value, less water consumptive crops. Effectiveness: Implementation of this program would be effective in minimizing long-term social and economic effects, helping to sustain regional income, increasing economic linkages and economic development within the region, and promoting sustainability in the farming and ranching community.

GW-SE-9: To Facilitate Local Planning and Ensure Timely Response in the Event of Problems. A cooperative effort should be undertaken by the respective state engineers of Nevada and Utah, SNWA, and White Pine, Lincoln,

and Millard counties, to develop and implement a comprehensive socioeconomic monitoring program as an adjunct to the stipulated agreement for Spring Valley and proposed 3M Plan for Snake Valley. This effort could include creation of an "Ombudsmen" position, perhaps within the NSE, to ensure public access and timely response regarding groundwater issues. Effectiveness: Implementation of this measure would be effective in disclosing to the public the actual socioeconomic effects of groundwater pumping contrasted with forecast effects, SNWA's performance on the various agreements, and the effectiveness of other mitigation measures.

GW-SE-10: To Help Maintain Local Government Fiscal Strength. If SNWA purchases additional private property or pays another party to establish a permanent conservation easement on productive agricultural or timber lands that results in a reduction in taxable value, SNWA should provide annual "payments in lieu of taxes" to the affected county to offset any resulting reductions in ad valorem taxes. Effectiveness: Implementation of this program would be effective in minimizing long-term adverse effects on local county budgets that arise from efforts to mitigate adverse impacts on other environmental resources. It would not be effective in mitigating social and economic impacts resulting from additional loss of ranching families.

Potential residual impacts include:

- Few residual social and economic effects would be associated with the future facilities component of the Proposed Action following the completion of construction and reclamation. The residual effects include a small number of jobs and income in the rural areas.
- Residual effects of groundwater pumping and drawdown would include many of the social and economic effects described above. Such effects would arise from the long-term drawdown of groundwater and cannot be reasonably mitigated or avoided because they are inherent with groundwater drawdown. These effects would endure beyond the 200-years of pumping assumed for the assessment.
- Residual social and economic changes in Lincoln County and the Las Vegas Valley could arise in conjunction with growth enabled, but not caused by the water conveyed via the pipeline.
- The ACMs recognize certain protections for holders of existing water rights that would not necessarily inure to the users of those water rights. The protection measures do not directly address adverse economic effects of drawdown on the public. Moreover, some of the environmental protection measures may themselves result in higher or more intense social and economic effects in the rural areas. For example, purchasing private property in Snake Valley to benefit the spring snail habitat (ACM C.2.16) would remove more land from the public tax rolls and further alter the social context of Spring Valley and White Pine counties as a whole.
- The optimization of the points of diversion would have little influence on these residual effects from a social and economics perspective.

3.18.2.10 Alternative A

Groundwater Development Areas

Alternative A would involve development of between 108 and 131 groundwater production wells, compared with up to 174 wells under the Proposed Action. Maximum annual groundwater production of up to 114,755 afy would occur under Alternative A, approximately 35 percent lower than the Proposed Action.

Production wells would be developed in four phases and the same five groundwater production basins as under the Proposed Action; however, fewer wells would be developed in all areas. The short- and long-term social and economic effects of construction of the future facilities under Alternative A would include temporary employment and income, population gains, housing demand, effects on local lodging, retail and service establishments, and the other social and economic effects described above for the Proposed Action. The scale of the impacts would be lower under Alternative A than under the Proposed Action. Average annual employment during the four phases, including the direct and indirect and induced jobs, would be 69 in conjunction with the well field development activity in the Delamar, Dry Lake, and Cave valleys, 85 jobs during each of the two phases of development in Spring Valley (years 14 thru 16 and years 31 thru 33), and 105 jobs associated with future facilities development in Snake Valley (**Table 3.18-39**).

The Baker/Snake Valley community might experience limited population gains and demands for temporary housing in conjunction with groundwater production development in the Spring Valley. The Baker/Snake Valley community

would experience further short term socioeconomic effects in conjunction with the groundwater well field development in the Snake Valley, assumed to occur in years 36 through 38. Average direct employment is projected at 67 jobs during that project. In addition, some portion of the 42 indirect and induced jobs supported by the construction would be located in the community. The social and economic impact in Baker/Snake Valley could be significant during the latter period, due to the scale of the temporary demands relative to the size of the community. Ely, Nevada, and Delta, Utah, also might see short-term economic effects from this phase of future facilities development.

In general, the combination of accessibility/proximity to several communities and sizes of these communities provides sufficient capacity to reasonably accommodate the short-term demands associated with the first three phases of future facility development. Condensing the development schedule of any given phase, such as deploying additional drilling rigs to implement the Spring Valley future facilities program in a single 3-year period or concurrent implementation of the Spring and Snake valley programs, would result in higher temporary employment, population and housing demand impacts, which could strain local capabilities to accommodate and cope with the growth.

Table 3.18-39 Short-term Employment and Population Effects, Future Facilities Development for Alternative A

	Delamar, Dry Lake, and Cave Valleys	Spring Valley	Snake Valley
Number of Production Wells	Up to 19 total	Up to 64	Up to 48
Timing of Exploratory Drilling	Year 4	Years 9 thru 11 (South) Years 27 and 28 (North)	Years 32 and 33
Timing of Production Well and Collector Pipeline Development	Years 5 thru 8	Years 14 thru 16 (South) Years 31 thru 33 (North)	Years 36 thru 38
Temporary Employment Effects - Average			
Direct employment	41	51 per phase	67
Indirect/Induced Jobs[1]	28	34 per phase	42
Total Temporary Jobs, Future Facilities	69	85 per phase	109
Incremental Temporary Population			
Weekdays	78	96 per phase	119
Weekends	41	55 per phase	68
Temporary Housing Demand (Units)	46	56 per phase	59

[1] Based on a jobs multiplier of 0.67 indirect and induced jobs per direct job.

Temporary population gains during the work week for the four periods of future facility development are 78, 96, and 119, respectively for the Spring, Snake, Delamar, Dry Lake, and Cave valley projects; again, these gains are smaller in scale but affect the same communities in ways similar to those under the Proposed Action.

The effects on population, employment, labor force, and economic structure would result in corresponding effects on social organization and conditions in the affected communities as described above in conjunction with the Proposed Action. In the rural communities, these would include continuation and potential elevation of existing project-related attitudes, opinions, and associated social effects including political conflict, social dissension, community discord, and personal distress. For some residents of the rural area, particularly those in Snake and Spring valleys, personal distress would stem from the risk of loss of a valued rural way of life.

Not all residents of the rural areas oppose the project. For example, for some residents, organizations, and community leaders in Lincoln County may view favorably the trade-offs between groundwater pumping, future development, and other economic activity and the potential social and economic risks of groundwater drawdown.

Within the Las Vegas Valley, some residents, organizations, community and political leaders, and development interests may view initiation of groundwater pumping as a measure of assurance that water will be available to enable growth and provide a buffer against future water shortages due to episodic drought or climate change. At the same time, residents and other stakeholder groups of the Las Vegas Valley are likely to remain divided on their support for

the groundwater development project because of the implications of growth for the areas' environment and quality of life, concern about the project's cost and concern about the equity and environmental consequences of groundwater pumping for the rural areas.

Groundwater Pumping

Under Alternative A, groundwater production by SNWA is assumed to eventually reach 114,755 afy by full build out. In addition, the main pipeline may be used to convey additional water on behalf of the LCWD. The groundwater simulations indicate that the areal and vertical extents of groundwater drawdown under Alternative A would be extensive, but less severe than for the Proposed Action. The long-term groundwater drawdown generally would affect the same communities, public water systems, private landowners, public lands, and natural resources, although the effect may vary in degree. Consequently, the short- and long-term social and economic effects of project operations under Alternative A would be similar to those under the Proposed Action, although some long-term differences are expected, principally with respect to the potential impacts to the region's agricultural sector from higher production costs and lower overall output.

The groundwater simulations indicate that 59+ percent of the total agricultural lands (14,605 acres) would be affected by vertical drawdown in excess of 10 feet at the end of full build out plus 75 years. Of the affected lands, nearly 13,300 acres overlie areas having projected drawdown of 20 to 99 feet, the latter being sufficient to result in higher irrigation pumping and new well development costs. Some of the affected lands are SNWA-owned. An additional 1,310 acres of land cover areas where drawdown of 10 to 19 feet is projected. Because of differences in existing well depths and productive groundwater zones for an individual well, groundwater drawdown would affect individual property owners differentially. Farmers and ranchers owning these lands could experience diminished land values as a result. The groundwater modeling does not project drawdown in excess of 100 feet under the agricultural lands in Spring and Snake valleys.

The groundwater simulations indicate that pumping for 200 years after full build out of the system would result in projected drawdown of 10 feet or more under 15,021 acres of private agricultural lands. The groundwater modeling does not project drawdown in excess of 100 feet under the agricultural lands in Spring and Snake valleys (**Table 3.18-40**).

Table 3.18-40 Acres of Private Agricultural Lands Affected By Long-Term Drawdown, Alternative A

Private Agriculture Lands	Spring Valley			Snake Valley			Combined Total			
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out Plus 200 Years
	6,111 acres			18,489 acres			24,600 acres			
Drawdown Interval	Acres Within Interval			Acres Within Interval			Acres Within Interval			% of Total
Unaffected to <10'	5,779	2,476	2,281	18,489	7,519	7,298	24,268	9,995	9,579	38.9
10' - 19'	332	427	413	-	883	326	332	1,310	738	3.0
20' - 49'	-	3,208	501	-	9,946	2,190	-	13,155	2,691	10.9
50' - 99'	-	-	2,916	-	140	8,676	-	140	11,592	47.1
100' - 200'	-	-	-	-	-	-	-	-	-	0.0
200' or more	-	-	-	-	-	-	-	-	-	0.0
Total Affected Acres	332	3,635	3,830	-	10,970	11,191	332	14,605	15,021	61.1
% of Total	5.4	59.5	62.7	0.0	58.2	59.4	1.4	59.4	61.1	-

Notes:

Drawdown is as compared to the existing groundwater elevation, not the surface elevation.

Impacts to agricultural irrigation, individual and community wells located near private agricultural lands, and stock watering facilities may result from drawdown of less than 10 vertical feet from existing groundwater elevation.

Implementation of Alternative A would result in social and economic effects associated with long-term groundwater pumping that would be comparable to those outlined for the Proposed Action in **Table 3.18-38**, allowing for some variations associated with the timing and extent of drawdown.

Future interbasin water transfer fees with Alternative A would reach a maximum of $1.23 million annually, $619,000 less than under the Proposed Action.[24] The actual levels of revenue would reflect the annual volume of production. The distribution of revenues between White Pine and Lincoln counties would depend on future determinations regarding the allocation of the Spring Valley water by the NSE, and both counties would retain the option to negotiate an alternative revenue arrangement with the SNWA.

Projected long-term groundwater drawdown would occur under 4,926 acres of public lands in Lincoln and White Pine counties that were identified for potential disposal in the Ely RMP. There is no specific timetable for such disposals nor is the specific use or user known at this time. However, approval of the GWD Project, with its foreseeable implications on drawdown, could have an adverse effect on the utility of those lands, the likelihood of disposal, and associated effects on the BLM in terms of management.

Due to the lower rates of groundwater production with Alternative A, residents and communities along Utah's Wasatch Front may be less concerned about the indirect effects of the project on dust and air quality than they would be in conjunction with the Proposed Action.

Environmental Justice impacts to minority and low-income populations would not be anticipated under Alternative A.

Conclusion. Construction and operation of the groundwater production and associated future facilities and subsequent pumping and conveyance of groundwater to Clark County and other locations in Lincoln County (the latter occurring under the terms of a contractual agreement between the SNWA and the LCWD) would have a combination of short-term and long-term social and economic effects in the region. The short-term effects would include temporary migration, population influx, housing demand, demands on public facilities and services, and social effects similar to, but smaller in scale than those associated with the Proposed Action. The short-term social and economic effects of construction would diminish rapidly then effectively cease following the completion of construction.

For some interests in Lincoln County and the Las Vegas Valley, the onset of groundwater pumping would be welcomed as an indication that water resources to provide buffer against drought and accommodate economic and population growth would be available. Due to the lower volume of additional groundwater to be developed, interests favoring groundwater development would be less satisfied by development under Alternative A than with the Proposed Action. Other interests would be distressed at the potential for continued growth and development in the Las Vegas Valley at recent levels.

The initiation of groundwater pumping, transbasin diversions, and long-term drawdown would contribute to political conflict, social dissension, community discord and personal distress as well as a diminished sense of self-determination and anxiety about the eventual detrimental effects on lifestyle felt by many residents of the rural areas. The long-term effects arising from groundwater pumping and drawdown present risks to social and economic conditions in the rural areas, although uncertainty and the decades and centuries long period over which these effects would arise complicate the description and assessment of such effects. Foreseeable impacts include adverse effects of drawdown on local agriculture, outdoor recreation and tourism, and future economic growth and development. Economic development effects would likely be related the perception of the risks of drawdown as well as the actual effects. Potential adverse economic effects including reductions in income and employment in the agricultural and outdoor recreation sectors could generate similar effects in secondary sectors such as retail, service, and government, particularly if these effects resulted in out-migration of population. Any curtailment in future economic development opportunities including second and retirement home development and lifestyle migration would have similar secondary effects. Local governments may experience reductions in revenues from affected industries, which could also result in reductions in

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[24] The maximum annual interbasin transfer fees include $80,000 per year associated with the conveyance of 8,000 afy of groundwater presently produced for agricultural use in White Pine County that would be converted to municipal use and conveyed through the pipeline.

service levels. Adverse economic, population, and fiscal effects could in turn generate changes in social organization and community cohesion stemming from out-migration and changes in traditional local industries, occupations, and lifestyles. The long-term areal extent and magnitude of drawdown effects under Alternative A would be less than those under the Proposed Action.

Implementation of Alternative A would support the same ACMs outlined for the Proposed Action.

Proposed Mitigation Measures:

The COM Plan would be implemented for all future groundwater development facilities associated with the GWD Project. Although most of the environmental protection and monitoring and mitigation measures do not relate directly to social and economic conditions, they do relate to environmental resources that indirectly affect those conditions and the quality-of-life of residents and visitors to the area. Consequently, to the extent that COM Plan contributes to avoiding or reducing adverse impacts, it would also represent mitigation for social and economic conditions.

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Mitigation measures GW-SE-6 through GW-SE-10, as described for the Proposed Action, also would be applied to Alternative A.

Potential residual impacts include:

- Implementation of Alternative A would have similar but smaller scale residual social and economic effects than the Proposed Action following the completion of construction and reclamation. The residual effects include a small number of jobs and income in the rural areas.
- Residual effects of groundwater pumping and drawdown would include many of the social and economic effects described above. Such effects would arise from the long-term drawdown of groundwater and cannot be reasonably mitigated or avoided because they are inherent with groundwater drawdown. These effects would endure beyond the 200 years of pumping assumed for the assessment.
- Residual social and economic changes in Lincoln County and the Las Vegas Valley could arise in conjunction with growth enabled, but not caused by the water conveyed via the pipeline.
- The ACMs recognize certain protections for holders of existing water rights that would not necessarily innure to the users of those water rights. The protection measures do not directly address adverse economic effects of drawdown on the public. Moreover, some of the environmental protection measures may themselves result in higher or more intense social and economic effects in the rural areas. For example, purchasing private property in Snake Valley to benefit the spring snail habitat (ACM C.2.16) would remove more land from the public tax rolls and further alter the social context of Spring Valley and White Pine counties as a whole.
- The scale of these residual effects would be less from a social and economics perspective due to the lesser extent of drawdown, but they would not be eliminated.

3.18.2.11 Alternative B

Groundwater Development Areas

Alternative B would involve the development of 116 groundwater production wells, yielding up to 176,655 afy. The maximum annual production under Alternative B would be the same as under the Proposed Action. Production wells would be developed in four phases and in the same five groundwater production basins as under the Proposed Action; however, fewer wells would be developed in all areas.

The short- and long-term social and economic effects of construction of the future facilities under Alternative B would include temporary employment and income, population gains, housing demand, effects on local lodging, retail and service establishments, and the other social and economic effects described above for the Proposed Action. The scale of the impacts would be lower. Average annual employment during the four phases, including direct, indirect, and induced jobs, ranges from 96 in conjunction with the well field development in the Delamar, Dry Lake, and Cave valleys to 75 during each phase of future facilities development in Spring Valley (**Table 3.18-41**).

Table 3.18-41 Short-term Employment and Population Effects, Future Facilities Development for Alternative B

	Delamar, Dry Lake, and Cave Valleys	Spring Valley	Snake Valley
Number of Production Wells	Up to 24 total	Up to 56	Up to 36
Timing of Exploratory Drilling	Year 4	Years 9 thru 11 (South) Years 27 and 28 (North)	Years 32 and 33
Timing of Production Well and Collector Pipeline Development	Years 5 thru 8	Years 14 thru 16 (South) Years 31 thru 33 (North)	Years 36 thru 38
Total Jobs, Future Facilities – Average	96	74 per phase	78
Incremental Temporary Population			
Weekdays	109	84 per phase	88
Weekends	54	47 per phase	50
Temporary Housing Demand (Units)	63	50 per phase	52

Temporary population gains during the workweek for the 4 periods of future facility development are 109, 84, and 88, respectively for the Delamar, Dry Lake, and Cave valleys, each phase of the Spring Valley, and the Snake Valley projects. The temporary population gains, corresponding demand for temporary housing, and indirect effects on local businesses and demands for services associated with the Spring, Delamar, Dry Lake, and Cave valleys projects would primarily affect Pioche, Panaca, and Caliente in Lincoln County and Ely in White Pine County.

In general, the combination of accessibility/proximity to several communities and sizes of these communities provides sufficient capacity to reasonably accommodate the short-term demands associated with the first three phases of future facility development. Condensing the development schedule of any given phase, such as deploying additional drilling rigs to implement the Spring Valley future facilities program in a single 3-year period, or concurrent implementation of the Spring and Snake valley programs, would result in higher temporary employment, and population and housing demand impacts, which could strain local capabilities to accommodate and cope with the growth.

The Baker/Snake Valley community may experience limited population gains and demands for temporary housing in conjunction with groundwater production in the Spring Valley. The Baker/Snake Valley community would experience further short-term socioeconomic effects in conjunction with the development of groundwater well fields in Snake Valley, assumed to occur in years 36 and 38. The social and economic impact in Baker/Snake Valley could be significant during the latter period, due to the scale of the temporary demands relative to the size of the community. Ely, Nevada, and Delta, Utah, also might see short-term economic effects from this phase of future facilities development.

The effects on population, employment, labor force, and economic structure would result in many corollary effects on social organization and conditions in the affected communities. In the rural communities, these would include continuation and potential elevation of existing project-related attitudes, opinions, and associated social effects including political conflict, social dissension, community discord, and personal distress. For some residents of the rural area, particularly those in Snake and Spring valleys, personal distress would stem from the risk of loss of a valued rural way of life.

Not all residents of the rural areas oppose the project. For example, some residents and community leaders in Lincoln County may view the trade-offs between the groundwater pumping and future development and the potential social and economic risks from groundwater drawdown in a favorable light.

Within the Las Vegas Valley, some residents, organizations, community and political leaders, and development interests may view initiation of groundwater pumping as a measure of assurance that water will be available to enable growth and provide a buffer against future water shortages due to episodic drought or climate change. At the same time, residents and other stakeholder groups of the Las Vegas Valley are likely to remain divided on their support for the groundwater development project because of the implications of growth for the areas' environment and quality of life, concern about the project's cost and concern about the equity and environmental consequences of groundwater pumping for the rural areas.

Groundwater Pumping

Under Alternative B, groundwater production by the SNWA is assumed to eventually reach 176,655 afy by full build out (in about the year 38). In addition, the main pipeline may be used to convey additional water on behalf of the LCWD, as well as up to 8,000 afy of water presently produced by the SNWA for agricultural use in White Pine County. The groundwater simulations indicate that the areal and vertical extents of groundwater drawdown under Alternative B would be extensive, affecting the same communities, public water systems, private landowners, public lands and natural resources as the Proposed Action, although the effects may vary in degree. The short- and long-term social and economic effects of project operations under Alternative B would be similar to those under the Proposed Action, although long-term differences are expected, principally with respect to the potential impacts to the region's agricultural sector. Impacts would be associated with higher production costs and the potential reductions in overall output.

The groundwater simulations indicate that 56+ percent of the total agricultural lands (13,865 acres) would be affected by vertical drawdown in excess of 10 feet at the end of the full build out plus 75 years. Of the affected lands, nearly 13,100 acres overlie areas having projected drawdown of 20 to 99 feet, such drawdown being sufficient to result in higher irrigation pumping and new well development costs. Some of the affected properties are SNWA-owned. An additional 539 acres of land cover areas where drawdown of 10 to 19 feet is projected. Agricultural productivity may be adversely affected if higher costs result in reduced water application rates. Farmers and ranchers owning these lands could experience diminished land values as a result. The groundwater modeling projects groundwater drawdown in excess of 100 feet under 231 acres of agricultural lands in Spring and Snake valleys.

Following full build out plus 200 years of pumping of the groundwater production facilities, projected drawdown in excess 10 feet would occur under 14,844 acres of private agricultural lands (60.3 percent of the total). The groundwater modeling projects drawdown in excess of 100 feet under more than 3,200 acres of agricultural lands in Spring and Snake valleys. The majority of that total would be in Spring Valley (**Table 3.18-42**).

The transfer of groundwater produced from White Pine and Lincoln counties to Clark County under Alternative B would generate up to $1.77 million annually in interbasin transfer fees. Completion and operation of the pipeline under Alternative B would allow the SNWA to convey an additional 8,000 afy of groundwater that is presently produced for agricultural use in White Pine County, yielding up to $80,000 per year in additional interbasin transfer fees.

Projected long-term groundwater drawdown would occur under 7,255 acres of public lands located in Lincoln and White Pine counties identified for potential disposal in the Ely RMP. There is no proposed timetable for such disposals, nor is the specific use or user known at this time. However, approval of the GWD Project, with its foreseeable implications on drawdown could have an adverse effect on the utility of those lands, the likelihood of disposal, and associated effects on the BLM in terms of management.

Table 3.18-42 Acres of Private Agricultural Lands Affected By Long-Term Drawdown, Alternative B

Private Agriculture Lands	Spring Valley			Snake Valley			Combined Total			
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	
	6,111 acres			18,489 acres			24,600 acres			
Drawdown Interval	Acres Within Interval			Acres Within Interval			Acres Within Interval			% of Total
Unaffected to <10'	4,811	2,597	2,414	18,489	8,138	7,342	23,300	10,735	9,756	39.7
10' - 19'	968	151	183	-	388	796	968	539	979	4.0
20' - 49'	332	1,321	151	-	8,716	490	332	10,037	641	2.6
50' - 99'	-	2,042	575	-	1,016	9,413	-	3,058	9,988	40.6
100' - 200'	-	-	2,788	-	129	182	-	129	2,970	12.1
200' or more	-	-	-	-	102	266	-	102	266	1.1
Total Affected Acres	1,300	3,514	3,697	-	10,351	11,147	1,300	13,865	14,844	60.3
% of Total	21.3	57.5	60.5	0.0	54.9	59.1	5.3	56.4	60.3	-

Notes:

Drawdown is as compared to the existing groundwater elevation, not the surface elevation.

Impacts to agricultural irrigation, individual, and community wells located near private agricultural lands, and stock watering facilities may result from drawdown of less than 10 vertical feet from existing groundwater elevation.

As with the Proposed Action, Wasatch Front residents would continue to be concerned about the indirect effects of the project on dust and air quality arising in conjunction with long-term drawdown.

Environmental justice affects to minority and low-income populations would not be anticipated under Alternative B. Impacts to Native American traditional values could be greater or lesser depending on the relative importance to affected tribes of the specific springs and streams affected by reductions in flow and the magnitudes of those reductions.

Conclusion. Construction and operation of the groundwater production and associated future facilities and subsequent pumping and conveyance of groundwater under Alternative B would have a combination of short-term and long-term social and economic effects in the region. The short-term effects would include temporary migration, population influx, housing demand, demands on public facilities and services, and social effects similar to those associated with construction of groundwater production facilities under the Proposed Action. The short-term social and economic effects of construction would diminish rapidly, then effectively cease following the completion of construction.

For some interests in Lincoln County and the Las Vegas Valley, the onset of groundwater pumping would be welcomed as an indication that water resources to provide buffer against drought and accommodate economic and population growth would be available. Other interests would be distressed at the potential for continued growth and development in the Las Vegas Valley at recent levels.

The initiation of groundwater pumping, transbasin diversions, and long-term drawdown would contribute to political conflict, social dissension, community discord and personal distress as well as a diminished sense of self-determination and anxiety about the eventual detrimental effects on lifestyle felt by many residents of the rural areas. The long-term effects arising from groundwater pumping and drawdown present risks to social and economic conditions in the rural areas, although uncertainty and the decades and centuries long period over which these effects would arise complicate the description and assessment of such effects. Foreseeable impacts include adverse effects of drawdown on local agriculture, outdoor recreation and tourism, and future economic growth and development. Economic development effects likely would be related the perception of the risks of drawdown as well as the actual effects. Potential adverse

economic effects including reductions in income and employment in the agricultural and outdoor recreation sectors could generate similar effects in secondary sectors such as retail, service, and government, particularly if these effects resulted in out-migration of population. Any curtailment in future economic development opportunities including second and retirement home development and lifestyle migration would have similar secondary effects. Local governments may experience reductions in revenues from affected industries, which could also result in reductions in service levels. Adverse economic, population, and fiscal effects could in turn generate changes in social organization and community cohesion stemming from out-migration and changes in traditional local industries, occupations, and lifestyles. The long-term areal extent and magnitude of drawdown effects under Alternative A would be less than those under the Proposed Action. The long-term areal extent and magnitude of drawdown effects under Alternative B would be similar, although slightly lesser in extent that those under the Proposed Action.

Implementation of Alternative B would support the same ACMs outlined for the Proposed Action.

Proposed Mitigation Measures:

The COM Plan would be implemented for all future groundwater development facilities associated with the GWD Project. Although most of the environmental protection and monitoring and mitigation measures do not relate directly to social and economic conditions, they do relate to environmental resources that indirectly affect those conditions and the quality-of-life of residents and visitors to the area. Consequently, to the extent that COM Plan contributes to avoiding or reducing adverse impacts, it would also represent mitigation for social and economic conditions.

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Mitigation measures GW-SE-6 through GW-SE-10, as described for the Proposed Action, also would be applied to Alternative B.

Potential residual impacts include:

- Implementation of Alternative B would have similar but smaller scale residual social and economic effects than of the Proposed Action following the completion of construction and reclamation. The residual effects include a small number of jobs and income in the rural areas.
- Residual effects of groundwater pumping and drawdown would include many of the social and economic effects described above because those effects would arise from the long-term drawdown of groundwater and cannot be reasonably mitigated, or avoided because they are inherent with groundwater drawdown. These effects likely would endure beyond the 200-year assessment period.
- Residual social and economic effects in Lincoln County and the Las Vegas Valley could arise in conjunction with growth enabled, but not caused by the water conveyed via the pipeline.
- The scale of these residual effects would be less from a social and economics perspective due to the lesser extent of drawdown, but they would not be eliminated.

3.18.2.12 Alternative C

Groundwater Development Areas

Alternative C would involve the development of 108 to 131 groundwater production wells, the same number as under Alternative A. That level of development compares with up to 174 wells under the Proposed Action. Maximum annual groundwater production under Alternative C would be 114,755 afy, although annual production would vary over time in response to drought, availability of water from other sources, and other factors. Production wells would be developed in the same five groundwater production basins as under the Proposed Action; however, fewer wells would be developed in all areas.

The short- and long-term social and economic effects of construction of the future facilities under Alternative C would include temporary employment and income, population gains, housing demand, effects on local lodging, retail and service establishments, and the other social and economic effects described above for the Proposed Action, but be lower-scale/less intense. Average annual employment during the four phases of development, including the direct, indirect and induced jobs, would range from 85 to 105 jobs (**Table 3.18-43**). The peak temporary employment impact under Alternative C would occur in conjunction with future facilities development in the Snake Valley, rather than in conjunction with development in the Delamar, Dry Lake, and Cave valleys under the Proposed Action.

The temporary economic and social effects associated with future facilities development under Alternative C would be largely equivalent to those described for Alternative A. The temporary population gains, demand for temporary housing, and indirect effects on local businesses and demands for services associated with the Delamar, Dry Lake, Cave, and Spring valley projects would primarily affect Pioche, Panaca, and Caliente in Lincoln County and Ely in White Pine County. The Baker/Snake Valley community might experience limited population impact and associated demands for temporary housing and service in conjunction with groundwater production development in the Spring Valley and again in conjunction with the development of groundwater well fields in Snake Valley. The social and economic impact in Baker/Snake Valley could be significant during the latter period, due to the scale of the temporary demands relative to the size of the community. Ely, Nevada, and Delta, Utah, also might see short-term economic effects from this phase of future facilities development.

Table 3.18-43 Short-term Employment and Population Effects, Future Facilities Development for Alternative C

	Delamar, Dry Lake, and Cave Valleys	Spring Valley	Snake Valley
Number of Produetion Wells	Up to 19 total	Up to 64	Up to 48
Timing of Exploratory Drilling	Year 4	Years 9 thru 11 (South) Years 27 and 28 (North)	Years 32 and 33
Timing of Production Well and Collector Pipeline Development	Years 5 thru 8	Years 14 thru 16 (South) Years 31 thru 33 (North)	Years 36 thru 38
Total Temporary Jobs, Future Facilities	69	85 per phase	105
Incremental Temporary Population			
Weekdays	78	96 per phase	119
Weekends	41	64 per phase	68
Temporary Housing Demand (Units)	46	56 per phase	59

In general, the combination of accessibility/proximity to several communities and sizes of these communities provides sufficient capacity to reasonably accommodate the short-term demands associated with the first two phases of future facility development. Condensing the development schedule of any given phase, such as deploying additional drilling rigs to implement the Spring Valley future facilities program in a 2-year period, or implementing the Spring and Snake valley programs concurrently, would result in higher temporary employment, population, and housing demand impacts, which could strain local capabilities to accommodate and cope with the growth.

The effects on population, employment, labor force, and economic structure associated with construction would be comparable to those described for Alternative A above.

Groundwater Pumping

Under Alternative C, groundwater production by SNWA is assumed to reach 114,755 afy at full build out (in about the year 38). In addition, the main pipeline may be used to convey additional water on behalf of the LCWD. For the purposes of the groundwater modeling, future project-related production alternates between 12,000 and 114,755 afy, on 5-year intervals. The 5-year cycle is an assumption defined to simulate the effects of drought or other conditions necessitating groundwater pumping. The low end of the range reflects the minimum volume required to maintain the engineering integrity and functioning of the mainline system.

Based on the assumed 5-year on/5-year off pumping regime, future groundwater production would result in less rapid expansion of areas affected by substantial drawdown and less rapid and a smaller magnitude of vertical drawdown in the affected hydrologic basins. The groundwater simulations indicate that the areal and vertical extents of groundwater drawdown under Alternative C would be extensive, but less severe than those arising in conjunction with the Proposed Action. The long-term groundwater drawdown would affect the same communities, public water systems, private landowners, public lands, and natural resources, although the effect may vary in degree. Consequently, the short- and long-term social and economic effects of project operations under Alternative C would be similar to those under the Proposed Action, although some long-term differences are expected, principally with respect to potential impacts to the region's agricultural sector associated with higher production costs and the potential reduction in overall output.

The groundwater simulations indicate that 50 plus percent of the total agricultural lands (12,359 acres) would be affected by vertical drawdown in excess of 10 feet at the end of the full build out plus 75 years. Of the affected lands, more than 9,200 acres overlie areas having projected drawdown of 10 to 19 feet, which is sufficient to result in higher irrigation costs, but less likely to require more expensive well development and less likely to affect productivity substantially. Some of the affected properties are SNWA-owned. Nonetheless, farmers and ranchers owning these lands could experience diminished land values as a result. The groundwater modeling does not project drawdown in excess of 100 feet under the agricultural lands in Spring and Snake valleys.

Following 200 years of operation of the complete system, projected drawdown in excess 10 feet would occur under nearly 56 percent of the total private agricultural lands. The lesser areal extent and degree of drawdown would likely result in less adverse financial impacts on future irrigation costs, crop yields, and land values. The groundwater modeling does not project drawdown in excess of 50 feet under the agricultural lands in Spring and Snake valleys (**Table 3.18-44**).

The reduced level and areal extent of drawdown would, in turn, reduce the rate of water level declines in other wells, the necessity to deepen wells or locate alternative sources, and, the associated adverse effects on irrigation costs. Indirect effects on range and wildlife conditions that may affect allowable levels of grazing, hunting and other outdoor recreation would likely be delayed or of lesser magnitude than under the Proposed Action.

Projected long-term groundwater drawdown would occur under 4,926 acres of public lands identified for potential disposal in the Ely RMP. There is no specific timetable for such disposals, nor is the specific use or user known at this time. However, approval of the GWD Project, with its foreseeable implications on drawdown, could have an adverse effect on the utility of those lands, the likelihood of disposal, and associated effects on the BLM in terms of management.

Future interbasin water transfer fees would be lower due to the intermittent pumping assumed under Alternative C. The actual levels of revenue would reflect the annual volume of production. Under the 5-year on/5-year off production assumptions, and including allowances for the conveyance of up to 8,000 afy of present production, such revenues would average approximately $714,000, 61 percent lower than under the Proposed Action. The distribution of revenues between White Pine and Lincoln counties would depend on future determinations regarding the allocation of the Spring Valley water by the NSE, and both counties would retain the option to negotiate an alternative revenue arrangement with SNWA.

Table 3.18-44 Acres of Private Agricultural Lands Affected By Long-Term Drawdown, Alternative C

Private Agriculture Lands	Spring Valley			Snake Valley			Combined Total			
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	
	6,111 acres			18,489 acres			24,600 acres			
Drawdown Interval	**Acres Within Interval**			**Acres Within Interval**			**Acres Within Interval**			**% of Total**
Unaffected to <10'	5,779	3,162	2,903	18,489	9,079	7,948	24,268	12,241	10,851	44.1
10' - 19'	332	2,302	2,288	-	6,934	4,525	332	9,236	6,813	27.7
20' - 49'	-	647	921	-	2,475	6,016	-	3,123	6,937	28.2
50' or more	-	-	-	-	-	-	-	-	-	0.0
Total Affected Acres	332	2,949	3,208	-	9,410	10,541	332	12,359	13,749	55.9
% of Total	5.4	48.3	52.5	0.0	49.9	55.9	1.4	50.2	55.9	-

Notes:
Drawdown is as compared to the existing groundwater elevation, not the surface elevation.
Affects to agricultural irrigation, individual and community wells located near private agricultural lands, and stock watering facilities may result from drawdown of less than 10 vertical feet from existing groundwater elevation.

Alternative C likely would result in lesser adverse social effects for the rural part of the study area as a result of the smaller area affected by drawdown and the anticipated lower levels of drawdown. Although some anticipated social effects could still occur, the resultant change to the social context in the rural areas stemming from drawdown would be diminished as compared to the Proposed Action.

Due to the lower long-term average volume of groundwater production, Wasatch Front residents may be somewhat less concerned about the indirect effects of the project on dust and air quality, assuming implementation of Alternative C, than they would be in conjunction with the Proposed Action.

Conclusion. Construction and operation of the groundwater production and associated future facilities and subsequent pumping and conveyance of groundwater under Alternative C would have a combination of short-term and long-term social and economic effects in the region. The short-term effects would include temporary migration, population influx, housing demand, demands on public facilities and services, and social effects similar to those associated construction of groundwater production facilities under the Proposed Action. The short-term social and economic effects of construction would diminish rapidly, then effectively cease following the completion of construction.

For some interests in Lincoln County and the Las Vegas Valley, the onset of groundwater pumping would be welcomed as an indication that water resources to provide buffer against drought and accommodate economic and population growth would be available. Due to the lower volume of additional groundwater to be developed, interests favoring groundwater development would be less satisfied by development under Alternative C than with the Proposed Action. Other interests would be distressed at the potential for continued growth and development in the Las Vegas Valley at recent levels.

The initiation of groundwater pumping, transbasin diversions, and long-term drawdown would contribute to political conflict, social dissension, community discord and personal distress as well as a diminished sense of self-determination and anxiety about the eventual detrimental effects on lifestyle felt by many residents of the rural areas. The long-term effects arising from groundwater pumping and drawdown present risks of significant adverse effects on social and economic conditions in the rural areas, although uncertainty and the decades and centuries long period over which these effects would arise complicate the description and assessment of such effects. Foreseeable impacts include adverse effects of drawdown on local agriculture, outdoor recreation and tourism, and future economic growth and development. Economic development effects would likely be related the perception of the risks of drawdown as well as the actual effects. Potential adverse economic effects including reductions in income and employment in the

agricultural and outdoor recreation sectors could generate similar effects in secondary sectors such as retail, service, and government, particularly if these effects resulted in out-migration of population. Any curtailment in future economic development opportunities including second and retirement home development and lifestyle migration would have similar secondary effects. Local governments may experience reductions in revenues from affected industries, which could also result in reductions in service levels. Adverse economic, population, and fiscal effects could in turn generate changes in social organization and community cohesion stemming from out-migration and changes in traditional local industries, occupations and lifestyles. The long-term areal extent and magnitude of drawdown effects under Alternative C would be comparable to those under the Proposed Action.

ACMs under Alternative C would be the same as for the Proposed Action.

Proposed Mitigation Measures:

The COM Plan would be implemented for all future groundwater development facilities associated with the GWD Project. Although most of the environmental protection and monitoring and mitigation measures do not relate directly to social and economic conditions, they do relate to environmental resources that indirectly affect those conditions and the quality-of-life of residents and visitors to the area. Consequently, to the extent that COM Plan contributes to avoiding or reducing adverse impacts, it would also represent mitigation for social and economic conditions.

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Mitigation measures GW-SE-6 through GW-SE-10, as described for the Proposed Action, also would be applied to Alternative C.

*Potential r*esidual impacts include:

- Implementation of Alternative C would have similar but smaller scale residual social and economic effects than the Proposed Action following the completion of construction and reclamation. The residual effects include a small number of jobs and income in the rural areas.
- Residual effects of groundwater pumping and drawdown would include many of the social and economic effects described above because those effects would arise from the long-term drawdown of groundwater and cannot be reasonably mitigated or avoided because they are inherent with groundwater drawdown. These effects would likely endure beyond the 200-year assessment period.
- Residual social and economic effects in Lincoln County and the Las Vegas Valley could arise in conjunction with growth enabled, but not caused by the water conveyed via the pipeline.
- The scale of these residual effects would be less from a social and economic perspective due to the lesser extent of drawdown associated with intermittent pumping, but they would not be eliminated.

3.18.2.13 Alternative D

Groundwater Development Areas

Alternative D would involve the development of up to 83 groundwater production wells, compared with up to 174 wells under the Proposed Action. Production wells would be developed in two phases in the Spring, Delamar, Dry Lake, and Cave valleys, with the latter confined to areas within Lincoln County. No project-related groundwater production facilities would be developed in White Pine County.

The short- and long-term social and economic effects of construction of the future facilities under Alternative D would be somewhat similar, but smaller in scale and less geographically dispersed than those for the Proposed Action. Specifically, the short-term effects associated with construction and long-term effects associated with production from northern Spring Valley and the Snake Valley would not occur under Alternative D. Eliminating these effects would result in less employment, a shorter development schedule and lower levels of indirect support from vendors or suppliers, induced employment, and effects on local retail sales, housing demand, or other social and economic effects when compared to the Proposed Action.

Average annual employment during the two construction phases for Alternative D, including the direct, indirect and induced effects, would be 69 jobs in conjunction with the future facilities development activity in the Delamar, Dry Lake, and Cave valleys and 85 jobs during the development in Spring Valley (**Table 3.18-45**).

Table 3.18-45 Short-term Employment and Population Effects, Future Facilities Development, Alternative D

	Delamar, Dry Lake, and Cave Valleys	Spring Valley	Snake Valley
Number of Production Wells	Up to 19 total	Up to 64 (in 2 phases)	0
Timing of Exploratory Drilling	Year 4	Years 9 thru 11 (South) Years 27 and 28 (North)	NA
Timing of Production Well and Collector Pipeline Development	Years 5 thru 8	Years 14 thru 16 (South) Years 31 thru 33 (North)	NA
Total Temporary Jobs, Future Facilities	69	85 per phase	NA
Incremental Temporary Population			
Weekdays	78	96 per phase	NA
Weekends	41	64 per phase	NA
Temporary Housing Demand (Units)	46	56 per phase	NA

Temporary population gains during the workweek for the 2 periods of future facility development are 78 and 96, respectively, for the Spring, Delamar, Dry Lake, and Cave valleys projects. The temporary population gains, corresponding demand for housing, and indirect effects on local businesses and demands for services associated with the Spring, Delamar, Dry Lake, and Cave valleys projects would primarily affect Pioche, Panaca, and Caliente in Lincoln County and Ely in White Pine County. The Baker/Snake Valley community might experience limited population gains and demands for temporary housing in conjunction with development in Spring Valley. Future short-term socioeconomic effects on the Baker/Snake Valley community associated with development of future facilities in Snake Valley would not occur under Alternative D.

In general, the combination of accessibility/proximity to several communities and sizes of these communities provides sufficient capacity to reasonably accommodate the short-term demands associated with future facility development.

The effects on population, employment, labor force, and economic structure would result in many corollary effects on social organization and conditions in the affected communities. In the rural communities, these effects would include continuation and potential elevation of existing project-related attitudes, opinions and associated social effects including political conflict, social dissension, community discord, and personal distress. Implementation of Alternative D would avoid some of the distress regarding perceptions of the risks of damage to the physical and biological environments, and concern for detrimental long-term effects on health, quality of life and livelihoods held by

residents of Snake Valley. Similar concerns held by some residents in other parts of White Pine and Lincoln County would continue.

Not all residents of the rural areas oppose the project. For these stakeholders, implementation of Alternative D may generate mixed reactions. On the one hand, it could be seen in an unfavorable light in that it provides for substantially less conveyance capacity, which potentially could limit intracounty water transfers. At the same time, the fact that implementation of Alternative D provides some conveyance capacity for any future intracounty water transfers within Lincoln County could be viewed favorably.[25]

Within the Las Vegas Valley, some residents, organizations, community and political leaders, and development interests, initiation of groundwater pumping may provide a measure of assurance that water will be available to enable some future growth and provide a buffer against future water shortages that would occur due to episodic drought or climate change. However, many of those same stakeholders would be less satisfied with Alternative D, when compared to the Proposed Action and Alternatives A through C, because the volume of water to be conveyed would be less. At the same time, residents and other stakeholder groups of the Las Vegas Valley are likely to remain divided on their support for the groundwater development project because of the implications of growth for the areas' environment and quality of life, concern about the project's cost and concern about the equity and environmental consequences of groundwater pumping for the rural areas.

Groundwater Pumping

Under Alternative D, groundwater production by the SNWA is assumed to eventually reach 78,755 afy by full build out (in about the year 2043). In addition, the main pipeline may be used to convey additional water on behalf of the LCWD. The groundwater simulations indicate that the areal and vertical extents of groundwater drawdown under Alternative D would be primarily affecting the Las Vegas Valley and communities, public water systems, private landowners, public lands and natural resources in Lincoln County, although the effect may vary in degree.

The short- and long-term social and economic effects of project operations under Alternative D would be similar to those under the Proposed Action, although long-term differences are expected due to differences in the areal and vertical extent of drawdown. The principal differences would be with respect to the potential impacts to the region's agricultural sector. The groundwater simulations indicate that about 1+ percent of the total agricultural lands in Spring and Snake valleys (299 acres) would be affected by vertical drawdown in excess of 10 feet at the end of full build out plus 75 years. The groundwater modeling does project drawdown in excess of 50 feet under agricultural lands in Spring and Snake valleys during this period. Such drawdowns would leave the local agricultural sector largely unaffected.

Following 200 years of full pumping volumes, projected drawdown in excess 10 feet would occur under 4,612 acres of private agricultural lands, approximately 19 percent of the total. The lesser areal extent and degree of drawdown would likely result in lesser adverse financial impacts on future irrigation costs, crop yields, and land values as a result. The groundwater modeling projects no drawdown in excess of 100 feet under the agricultural lands in Spring and Snake valleys at full build out plus 200 years (**Table 3.18-46**). Although no SNWA groundwater production would occur in Snake Valley, portions of the valley eventually would experience drawdown as the pumping effects propagate outwards from the points of pumping and affect seeps and springs that may contribute to groundwater recharge in Snake Valley.

Elimination of pipeline and groundwater development facilities in Snake Valley would dramatically reduce the number of people directly affected by long-term drawdown because Snake Valley is the most highly populated of the two inhabited groundwater production areas.

At full build out plus 200 years, projected long-term groundwater drawdown would occur under 915 acres of public lands identified for potential disposal in the Ely RMP. There is no specific timetable for such disposals, nor is the specific use or user known at this time. However, approval of the GWD Project, with its foreseeable implications on

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[25] This statement is made without consideration of any potential financial implications of the reduced conveyance capacity of the overall cost of the project, or changes in costs that might accrue to Lincoln County users as a result of the smaller project. The implications of Alternative D on the overall costs of the project, the financial details of the contract between the SNWA and the LCWD, and the subsequent impact of Alternative D on conveyance costs charged to the LCWD are outside the scope of this assessment.

drawdown, could have an adverse effect on the utility of those lands, the likelihood of disposal, and associated effects on the BLM in terms of management.

Table 3.18-46 Acres of Private Agricultural Lands Affected By Long-Term Drawdown, Alternative D

Private Agriculture Lands	Spring Valley			Snake Valley			Combined Total			
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	
	6,111 acres			18,489 acres			24,600 acres			
Drawdown Interval	Acres Within Interval			Acres Within Interval			Acres Within Interval			% of Total
Unaffected to <10'	6,111	5,913	4,000	18,489	18,388	15,988	24,600	24,301	19,988	81.3
10' - 19'	-	145	937	-	101	1,358	-	246	2,295	9.3
20' - 49'	-	53	975	-	-	1,143	-	53	2,118	8.6
50' - 99'	-	-	198	-	-	-	-	-	198	0.8
100' or more	-	-	-	-	-	-	-	-	-	0.0
Total Affected Acres	-	198	2,111	-	101	2,501	-	299	4,612	18.7
% of Total	0.0	3.2	34.5	0.0	0.5	13.3	0.0	1.2	18.7	-

Notes:
Drawdown is as compared to the existing groundwater elevation, not the surface elevation.
Affects to agricultural irrigation, individual, and community wells located near private agricultural lands, and stock watering facilities may result from drawdown of less than 10 vertical feet from existing groundwater elevation.

At full groundwater production levels, implementation of Alternative D would result in 57 percent lower annual interbasin water transfer fees, $0.79 million compared to $1.85 million under the Proposed Action. The difference reflects the foregone groundwater production and conveyance from northern Spring Valley and the Snake Valley. Lincoln County would likely realize a larger share of these revenues than under the Proposed Action, although White Pine County could still realize some revenues based on rulings by the NSE regarding the share of water recharge in Spring Valley that occurs in White Pine County.

Social effects of Alternative D for the rural areas would be somewhat reduced in the Snake Valley as compared to the Proposed Action, because no facilities would be developed in Snake Valley and a smaller area of Snake Valley would be affected by drawdown. Some level of anticipatory social effects would still be likely. Social effects of Alternative D would continue in Spring Valley, as the residents in that valley face the prospect of substantial drawdowns; drawdowns would be more geographically concentrated and more severe in the southern portion of Spring Valley, but not extend as far northward, as compared to those under the Proposed Action (see Section 3.3, Water Resources, **Figures 3.3.2-4** and **3.3.2-24**). The changes in drawdown in Spring Valley would likely result in lesser effects on vegetation, surface waters and other resources affecting wildlife, and hence, big game hunting in Spring Valley.

The more severe long-term drawdown projected in the southern portion of Spring Valley could result in more subsidence.

Las Vegas Valley business, economic development and real estate development interests, and residents concerned about water availability likely would be less satisfied with implementation of Alternative D as compared to the Proposed Action, because of the prospect of less water to serve future development and provide a buffer against drought.

The reduced risk of groundwater effects on Baker/Snake Valley would correspondingly reduce risks of indirect effects on resources that affect tourism, recreation and the local community's ability to support tourism, visitors and staff associated with GBNP.

Due to the lower overall volume of groundwater production and the lack of water production from the Snake Valley, Residents of downwind communities are likely to be somewhat less concerned about dust and air quality effects assuming implementation of Alternative D than they would be in conjunction with the Proposed Action.

Conclusion. Construction and operation of the groundwater production and associated future facilities and subsequent pumping and conveyance of groundwater under Alternative D would have a combination of short-term and long-term social and economic effects in the region. The short-term effects would include temporary migration, population influx, housing demand, demands on public facilities and services, and social effects similar to those associated with construction of groundwater production facilities under the Proposed Action. The short-term social and economic effects of construction would diminish rapidly, then effectively cease following the completion of construction. Alternative D would avoid most temporary social and economic effects in the Baker/Snake Valley community.

For some interests in Lincoln County and the Las Vegas Valley, the onset of groundwater pumping would be welcomed, marking the availability of additional water resources to provide buffer against drought and accommodate economic and population growth. Due to the lower volume of additional groundwater to be developed, interests favoring groundwater development would be less satisfied by development under Alternative D than with the Proposed Action. Other interests would be distressed at the potential for continued growth and development in the Las Vegas Valley at recent levels.

The initiation of groundwater pumping, transbasin diversions, and long-term drawdown would contribute to political conflict, social dissension, community discord and personal distress as well as a diminished sense of self-determination and anxiety about the eventual detrimental effects on lifestyle felt by many residents of the rural areas. The long-term effects arising from groundwater pumping and drawdown present risks to social and economic conditions in the rural areas, although uncertainty and the decades and centuries long period over which these effects would arise complicate the description and assessment of such effects. Foreseeable impacts include adverse effects of drawdown on local agriculture, outdoor recreation and tourism, and future economic growth and development. Economic development effects would likely be related the perception of the risks of drawdown as well as the actual effects. Potential adverse economic effects including reductions in income and employment in the agricultural and outdoor recreation sectors could generate similar effects in secondary sectors such as retail, service, and government, particularly if these effects resulted in out-migration of population. Any curtailment in future economic development opportunities including second and retirement home development and lifestyle migration would have similar secondary effects. Local governments may experience reductions in revenues from affected industries, which could potentially lead to reductions in service levels. Adverse economic, population, and fiscal effects could in turn generate changes in social organization and community cohesion stemming from out-migration and changes in traditional local industries, occupations, and lifestyles. The long-term areal extent and magnitude of drawdown effects under Alternative D would be substantially less than those under the Proposed Action. Alternative D would avoid virtually all (most?) long-term project-related social and economic effects in White Pine County, and particularly in the Baker/Snake Valley community including western Juab and Millard counties in Utah.

ACMs under Alternative D would be the same as for the Proposed Action.

Proposed Mitigation Measures:

The COM Plan would be implemented for all future groundwater development facilities associated with the GWD Project. Although most of the environmental protection and monitoring and mitigation measures do not relate directly to social and economic conditions, they do relate to environmental resources that indirectly affect those conditions and the quality-of-life of residents and visitors to the area. Consequently, to the extent that COM Plan contributes to avoiding or reducing adverse impacts, it would also represent mitigation for social and economic conditions.

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are

occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Mitigation measures GW-SE-6 through GW-SE-10, as described for the Proposed Action, also would be applied to Alternative D.

Potential residual impacts include:

- Implementation of Alternative D would have similar but smaller scale residual social and economic effects than the Proposed Action following the completion of construction and reclamation. The residual effects include a small number of jobs and income in the rural areas.
- Residual effects of groundwater pumping and drawdown would include many of the social and economic effects described above because those effects would arise from the long-term drawdown of groundwater and cannot be reasonably mitigated, or avoided because they are inherent with groundwater drawdown. These effects would likely endure beyond the 200-year assessment period.
- Residual social and economic effects in Lincoln County and the Las Vegas Valley could arise in conjunction with growth enabled, but not caused by the water conveyed via the pipeline.
- Residual impacts under Alternative D would be similar to those for the Proposed Action, but affecting a smaller geographical area in the portion of Spring Valley in White Pine County and with few or no residual effects in the Snake Valley.

3.18.2.14 Alternative E

Groundwater Development Areas

Alternative E would involve the development of up to 83 groundwater production wells, compared with up to 174 wells under the Proposed Action. Production wells would be developed in two phases in the Spring, Delamar, Dry Lake, and Cave valleys. Unlike Alternative D, the development of production wells in Spring Valley would not be confined to areas within Lincoln County. However, like Alternative D, no groundwater production facilities would be developed in Snake Valley.

The type of short- and long-term social and economic effects of construction of the future facilities under Alternative E would be similar to those for the Proposed Action, however, potential short-term effects associated with construction and long-term effects associated with production from Snake Valley under the Proposed Action would not occur under Alternative E. Eliminating these effects would result in less employment, a shorter development schedule and lower levels of indirect support from vendors or suppliers, induced employment, and effects on local retail sales, housing demand, or other social and economic effects when compared to the Proposed Action. The development of some additional wells in the portion of Spring Valley in White Pine County would result in minor shifts in temporary impacts from the communities in central Lincoln County to Ely in White Pine County.

Average annual employment during the two construction phases for Alternative E, including the direct, indirect, and induced effects, would be 69 jobs in conjunction with the future facilities development activity in the Delamar, Dry Lake, and Cave valleys and 85 jobs during the development in Spring Valley (**Table 3.18-47**).

Other temporary social and economic effects on population, housing, and indirect effects on local businesses and demands for services associated with the Spring, Delamar, Dry Lake, and Cave valleys projects under Alternative E would be comparable to those under Alternative D, affecting primarily Pioche, Panaca, and Caliente in Lincoln County and Ely in White Pine County. The Baker/Snake Valley community might experience limited temporary population gains and demands for temporary housing in conjunction with development in Spring Valley. In general, the

combination of accessibility/proximity to several communities and sizes of these communities provides sufficient capacity to reasonably accommodate the short-term demands associated with the first two phases of future facility development.

The future short-term socioeconomic effects on the Baker/Snake Valley community associated with the Proposed Action and Alternatives A through C would not occur under Alternative E as no future facilities would be developed in Snake Valley.

Table 3.18-47 Short-term Employment and Population Effects, Future Facilities Development, Alternative E

	Delamar, Dry Lake, and Cave Valleys	Spring Valley	Snake Valley
Number of Production Wells	Up to 19 total	Up to 64 (in 2 phases)	0
Timing of Exploratory Drilling	Year 4	Years 9 thru 11 (South) Years 27 and 28 (North)	NA
Timing of Production Well and Collector Pipeline Development	Years 5 thru 8	Years 14 thru 16 (South) Years 31 thru 33 (North)	NA
Total Temporary Jobs, Future Facilities	69	85 per phase	NA
Incremental Temporary Population			
Weekdays	78	96 per phase	NA
Weekends	41	64 per phase	NA
Temporary Housing Demand (Units)	46	56 per phase	NA

Implementation of Alternative E would largely avoid some of the distress of residents and others regarding the risks of damage to the physical and biological environments, concern for detrimental long-term effects on health, quality of life and livelihoods in the Snake Valley. Similar concerns held by residents and others regarding similar risks in other parts of White Pine and Lincoln counties would continue. Residents of Utah, particularly those in Juab and Millard counties would likely feel a sense of relief due to the reduced risk of groundwater drawdowns under Alternative E.

Not all residents of the rural areas oppose the project. For these stakeholders, implementation of Alternative E would likely be seen favorably, as it would still provide conveyance capacity for future intracounty water transfers.[26]

Within the Las Vegas Valley, for some residents, organizations, community and political leaders, and development interests, initiation of groundwater pumping may provide a measure of assurance that water will be available to enable growth and provide a buffer against future water shortages due to episodic drought or climate change. However, many of those same stakeholders would be less satisfied with Alternative E, when compared to the Proposed Action and Alternatives A through C, because the amount of water to be conveyed would be less. At the same time, residents, and other stakeholder groups of the Las Vegas Valley are likely to remain divided on their support for the groundwater development project because of the implications of growth for the areas' environment and quality of life, concern about the project's cost and concern about the equity and environmental consequences of groundwater pumping for the rural areas.

Groundwater Pumping

Under Alternative E, project-related groundwater production by the SNWA is assumed to eventually reach 78,755 afy by full build out (in about the year 38). In addition, the main pipeline may be used to convey up to 8,000 afy of water presently produced by the SNWA for agricultural use in White Pine County and water on behalf of the LCWD. The

[26] This statement is made without consideration of any potential financial implications of the reduced conveyance capacity of the overall cost of the project, or changes in costs that might accrue to Lincoln County users as a result of the smaller project. The implications of Alternative E on the overall costs of the project, the financial details of the contract between the SNWA and the LCWD, and the subsequent impact of Alternative E on conveyance costs charged to the LCWD are outside the scope of this assessment.

groundwater simulations indicate that the areal and vertical extents of groundwater drawdown under Alternative E would primarily affect the Las Vegas Valley and communities, public water systems, private landowners, public lands and natural resources in Lincoln County, although the effect may vary in degree. The short- and long-term social and economic effects of project operations under Alternative E would be similar to those under the Proposed Action. Some long-term differences are expected, due to difference in the areal and vertical extent of drawdown and subsequent implications for impacts to the region's agricultural sector.

The groundwater simulations indicate that nearly 60 percent of the total agricultural lands in Spring Valley (3,635 acres) would be affected by vertical drawdown in excess of 10 feet at the end of the full build out plus 75 years. The majority of the affected acreage would be on top of areas projected to see 20 to 49 feet of drawdown. By full build out plus 200 years, the total affected private agricultural acreage climbs to 3,791 acres, but the extent of drawdown would be more severe, with more than 2,900 acres overlaying areas projected to see 50 to 99 feet of drawdown (**Table 3.18-48**). Some of the affected lands are owned by the SNWA.

Table 3.18-48 Acres of Private Agricultural Lands Affected By Long-Term Drawdown, Alternative E

Private Agriculture Lands	Spring Valley			Snake Valley			Combined Total			
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out Plus 200 Years
	6,111 acres			18,489 acres			24,600 acres			
Drawdown Interval	Acres Within Interval			Acres Within Interval			Acres Within Interval			% of Total
Unaffected to <10'	5,779	2,476	2,320	18,489	18,489	18,489	24,268	20,965	20,809	84.6
10' - 19'	332	427	374	-	-	-	332	427	374	1.5
20' - 49'	-	3,208	501	-	-	-	-	3,208	501	2.0
50' - 99'	-	-	2,916	-	-	-	-	-	2,916	11.9
100' more	-	-	-	-	-	-	-	-	-	0.0
Total Affected Acres	332	3,635	3,791	-	-	-	332	3,635	3,791	15.4
% of Total	5.4	59.5	62.0	0.0	0.0	0.0	1.4	14.8	15.4	-

Notes:

Drawdown is as compared to the existing groundwater elevation, not the surface elevation.

Impacts to agricultural irrigation, individual, and community wells located near private agricultural lands, and stock watering facilities may result from drawdown of less than 10 vertical feet from existing groundwater elevation.

The groundwater simulations do not project drawdown in excess of 100 feet under agricultural lands in Spring Valley.

At full groundwater production levels, implementation of Alternative E would result in 53 percent lower annual interbasin water transfer fees than under the Proposed Action, $0.87 million compared to $1.85 million under the Proposed Action. Lincoln County would likely realize a larger share of these revenues than under the Proposed Action, although White Pine County could still realize revenues based on rulings by the NSE regarding the share of water recharge in Spring Valley occurring in White Pine County.

At full build out plus 200 years, projected long-term groundwater drawdown would occur under 107 acres of public lands identified for potential disposal in the Ely RMP. There is no specific timetable for such disposals, nor is the specific use or user known at this time. However, approval of the GWD Project, with its foreseeable implications on drawdown, could have an adverse effect on the utility of those lands, the likelihood of disposal, and associated effects on the BLM in terms of management.

Social effects of Alternative E for the rural areas would be substantially reduced in White Pine County, particularly in the Snake Valley, and in neighboring Juab and Millard counties, as compared to the Proposed Action, because no

facilities would be developed in Snake Valley and a smaller area of Snake Valley would be affected by drawdown. However, social effects of Alternative E related to groundwater production in Spring Valley could be seen, as the remaining residents in that valley face the prospect of long-term drawdown and the associated effects on the agricultural sector.

Las Vegas Valley business, economic development and real estate development interests and residents concerned about water availability would likely be less satisfied with implementation of Alternative E as compared to the Proposed Action, because of the prospect of less water to serve future development and provide a buffer against drought.

Due to the lower overall volume of groundwater production and the lack of water production from the Snake Valley. Residents of downwind communities are likely to be somewhat less concerned about dust and air quality effects assuming implementation of Alternative E than they would be in conjunction with the Proposed Action.

Conclusion. Construction and operation of the groundwater production and associated future facilities and subsequent pumping and conveyance of groundwater under Alternative E would have a combination of short-term and long-term social and economic effects in the region. The short-term effects would include temporary migration, population influx, housing demand, demands on public facilities and services, and social effects similar to those associated construction of groundwater production facilities under the Proposed Action. The short-term social and economic effects of construction would diminish rapidly, then effectively cease following the completion of construction. Alternative E would avoid most temporary social and economic effects in the Baker/Snake Valley community.

For some interests in Lincoln County and the Las Vegas Valley, the onset of groundwater pumping would be welcomed as an indication that water resources to provide buffer against drought and accommodate economic and population growth would be available. Due to the substantially lower volume of additional groundwater to be developed, interests favoring groundwater development would be less satisfied by development under Alternative E than with the Proposed Action. Other interests would be distressed at the potential for continued growth and development in the Las Vegas Valley at recent levels.

The initiation of groundwater pumping, transbasin water diversions, and long-term drawdown would contribute to political conflict, social dissension, community discord and personal distress as well as a diminished sense of self-determination and anxiety about the eventual detrimental effects on lifestyle felt by many residents of the rural areas. The long-term effects arising from groundwater pumping and drawdown present risks of significant adverse effects on social and economic conditions in the rural areas, although uncertainty and the decades and centuries long period over which these effects would arise complicate the description and assessment of such effects. Foreseeable impacts include adverse effects of drawdown on local agriculture, outdoor recreation and tourism, and future economic growth and development. Economic development effects would likely be related the perception of the risks of drawdown as well as the actual effects. Potential adverse economic effects including reductions in income and employment in the agricultural and outdoor recreation sectors could generate similar effects in secondary sectors such as retail, service, and government, particularly if these effects resulted in out-migration of population. Any curtailment in future economic development opportunities including second and retirement home development and lifestyle migration would have similar secondary effects. Local governments may experience reductions in revenues from affected industries, which could also result in reductions in service levels. Adverse economic, population, and fiscal effects could in turn generate changes in social organization and community cohesion stemming from out-migration and changes in traditional local industries, occupations and lifestyles. The long-term areal extent and magnitude of drawdown effects under Alternative E would be substantially less than those under the Proposed Action. Alternative E would avoid many of the long-term project-related social and economic effects in White Pine County as they relate to the Baker/Snake Valley community, and in western Juab and Millard counties in Utah, at least for the foreseeable future. However, long-term social and economic effects would arise in White Pine County in conjunction with groundwater development in Spring Valley.

ACMs under Alternative E would be the same as for the Proposed Action.

Proposed Mitigation Measures:

The COM Plan would be implemented for all future groundwater development facilities associated with the GWD Project. Although most of the environmental protection and monitoring and mitigation measures do not relate directly

to social and economic conditions, they do relate to environmental resources that indirectly affect those conditions and the quality-of-life of residents and visitors to the area. Consequently, to the extent that COM Plan contributes to avoiding or reducing adverse impacts, it would also represent mitigation for social and economic conditions.

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Mitigation measures GW-SE-6 through GW-SE-10, also would be applied to Alternative E.

Potential residual impacts include:

Implementation of Alternative E would have similar but smaller scale residual social and economic effects than the Proposed Action following the completion of construction and reclamation. The residual effects include a small number of jobs and income in the rural areas.

- Residual effects of groundwater pumping and drawdown would include many of the social and economic effects described above because those effects would arise from the long-term drawdown of groundwater and cannot be reasonably mitigated or avoided because they are inherent with groundwater drawdown. These effects would likely endure beyond the full build out plus 200-year assessment period.
- Residual social and economic effects in Lincoln County and the Las Vegas Valley could arise in conjunction with growth enabled, but not caused by the water conveyed via the pipeline.
- Residual impacts under would be similar to those for the Proposed Action, but affecting a smaller geographical area in the portion of Spring Valley in White Pine County and with little or no residual effects in Snake Valley.

3.18.2.15 Alternative F

Groundwater Development Areas

Alternative F would involve the development of up to 117 groundwater production wells, compared with up to 174 wells under the Proposed Action. Production wells would be developed in the Spring, Delamar, Dry Lake, and Cave valleys over a 3-to-4 year period. Unlike Alternative D, the production wells in Spring Valley would not be confined to areas within Lincoln County. However, like Alternative E, no groundwater production facilities would be developed in Snake Valley.

The short- and long-term social and economic effects of construction of the future facilities under Alternative F would be similar to those for Alternative E. Potential short-term effects associated with pipeline construction and long-term effects associated with production from Snake Valley under the Proposed Action would not occur under Alternative F. Eliminating these effects would result in less employment and lower levels of indirect support from vendors or suppliers, induced employment, and effects on local retail sales, housing demand, or other social and economic effects when compared to the Proposed Action. The development of additional wells in the portion of Spring Valley in White Pine County would result in minor shifts in temporary impacts from communities in central Lincoln County to Ely in White Pine County.

Average annual employment during the two construction phases for Alternative F, including the direct, indirect, and induced effects, would be120 jobs in conjunction with the future facilities development activity in the Delamar, Dry Lake, and Cave valleys and 106 jobs during future facilities development in Spring Valley (**Table 3.18-49**).

Table 3.18-49 Short-term Employment and Population Effects, Future Facilities Development, Alternative F

	Delamar, Dry Lake, and Cave Valleys	Spring Valley	Snake Valley
Number of Production Wells	Up to 30 total	Up to 87 (in 2 phases)	0
Timing of Exploratory Drilling	Year 4	Years 9 thru 11 (South) Years 27 and 28 (North)	NA
Timing of Production Well and Collector Pipeline Development	Years 5 thru 8	Years 14 thru 16 (South) Years 31 thru 33 (North)	NA
Total Temporary Jobs, Future Facilities	120	106 per phase	NA
Incremental Temporary Population			
Weekdays	136	120 per phase	NA
Weekends	72	72 per phase	NA
Temporary Housing Demand (Units)	79	70 per phase	NA

Other temporary social and economic effects on population, housing, and indirect effects on local businesses and demands for services associated with the Spring, Delamar, Dry Lake, and Cave valleys projects under Alternative F would be comparable to those under Proposed Action, affecting primarily Pioche, Panaca, and Caliente in Lincoln County and Ely in White Pine County. The Baker/Snake Valley community might experience limited temporary influx of workers and housing demand in conjunction with development in Spring Valley. In general, the combination of accessibility/proximity to several communities and sizes of these communities provides sufficient capacity to reasonably accommodate the short-term demands associated with future facility development.

Implementation of Alternative F would largely avoid some of the distress of residents and others regarding the risks of damage to the physical and biological environments, concern for detrimental long-term effects on health, quality of life and livelihoods in the Snake Valley. Similar concerns held by residents and others regarding similar risks in other parts of White Pine and Lincoln counties would continue.

Not all residents of the rural areas oppose the project. For these stakeholders, implementation of Alternative F would likely be seen favorably, as it would still provide conveyance capacity for future water transfers, both to the Las Vegas Valley and within Lincoln County.[27]

Within the Las Vegas Valley, for some residents, organizations, community and political leaders, and development interests, initiation of groundwater pumping may provide a measure of assurance that water will be available to enable growth and provide an additional buffer against future water shortages due to episodic drought or climate change. However, many of those same stakeholders would be less satisfied with Alternative F, when compared to the Proposed Action and Alternatives A through C, because the amount of water to be conveyed would be less. At the same time, residents and other stakeholder groups of the Las Vegas Valley are likely to remain divided on their support for the groundwater development project because of the implications of growth for the areas' environment and quality of life, concern about the project's cost and concern about the equity and environmental consequences of groundwater pumping for the rural areas.

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[27] This statement is made without consideration of any potential financial implications of the reduced conveyance capacity of the overall cost of the project, or changes in costs that might accrue to Lincoln County users as a result of the smaller project. The implications of Alternative F on the overall costs of the project, the financial details of the contract between the SNWA and the LCWD, and the subsequent impact of Alternative F on conveyance costs charged to the LCWD are outside the scope of this assessment.

Groundwater Pumping

Under Alternative F, project-related groundwater production by the SNWA is assumed to eventually reach 114,129 afy by full build out (in about the year 33). In addition, the main pipeline may be used to convey up to 8,000 afy of water presently produced by the SNWA for agricultural use in White Pine County and water on behalf of the LCWD. The groundwater simulations indicate that the areal and vertical extents of groundwater drawdown under Alternative F would primarily affect the Las Vegas Valley and communities, public water systems, private landowners, public lands and natural resources in Lincoln County, although the effect may vary in degree. The short- and long-term social and economic effects of project operations under Alternative F would be similar to those under the Proposed Action. Some long-term differences are expected, due to difference in the areal and vertical extent of drawdown and subsequent implications for impacts to the region's agricultural sector.

The groundwater simulations indicate that nearly 60 percent of the total agricultural lands in Spring Valley (3,635 acres) would be affected by vertical drawdown in excess of 10 feet at the end of the full build out plus 75 years. The majority of the affected acreage would in areas projected to see 20 to 49 feet of drawdown. By full build out plus 200 years, the total affected private agricultural acreage climbs to 3,791 acres, but the extent of drawdown would be more severe, with more than 2,900 acres overlaying areas of 50 to 99 feet of projected drawdown (**Table 3.18-50**). Some of the affected lands are owned by the SNWA.

Table 3.18-50 Acres of Private Agricultural Lands Affected By Long-Term Drawdown, Alternative F

Private Agriculture Lands	Spring Valley			Snake Valley			Combined Total			
	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out	Full Build Out Plus 75 Years	Full Build Out Plus 200 Years	Full Build Out Plus 200 Years
	6,111 acres			18,489 acres			24,600 acres			
Drawdown Interval	Acres Within Interval			Acres Within Interval			Acres Within Interval			% of Total
Unaffected to <10'	5,559	2,728	2,493	18,489	18,489	18,489	24,048	21,217	20,982	85.3
10' - 19'	552	135	290	-	-	-,	552	135	290	1.2
20' - 49'	-	2,606	298	-	-	-	-	2,606	298	1.2
50' - 99'	-	642	3,030	-	-	-	-	642	3,030	12.3
100' more	-	-	-	-	-	-	-	-	-	0.0
Total Affected Acres	552	3,383	3,618	-	-	-	552	3,383	3,618	14.7
% of Total	9.0	55.4	59.2	0.0	0.0	0.0	2.2	13.8	14.7	-

Notes:

Drawdown is as compared to the existing groundwater elevation, not the surface elevation.

Impacts to agricultural irrigation, individual, and community wells located near private agricultural lands, and stock watering facilities may result from drawdown of less than 10 vertical feet from existing groundwater elevation.

The groundwater simulations do not project drawdown in excess of 100 feet under agricultural lands in Spring Valley.

At full groundwater production levels, implementation of Alternative F would result in 53 percent lower annual interbasin water transfer fees than under the Proposed Action, $0.87 million compared to $1.85 million under the Proposed Action. Lincoln County would realize a larger share of these revenues than under the Proposed Action, although White Pine County would still realize revenues based on rulings by the NSE regarding the share of water recharge in Spring Valley occurring in White Pine County.

At full build out plus 200 years, projected long-term groundwater drawdown would occur under 107 acres of public lands identified for potential disposal in the Ely RMP. There is no specific timetable for such disposals, nor is the specific use or user known at this time. However, approval of the GWD Project, with its foreseeable implications on

drawdown, could have an adverse effect on the utility of those lands, the likelihood of disposal, and associated effects on the BLM in terms of management.

Social effects of Alternative F for the rural areas would be substantially reduced in Millard, Juab, and White Pine counties, as compared to the Proposed Action, because no facilities would be developed in Snake Valley and a smaller area of Snake Valley would be affected by drawdown. However, social effects of Alternative F would include those ties to groundwater production in Spring Valley, as the remaining residents in that valley face the prospect of long-term drawdown and the associated effects on the agricultural sector.

Las Vegas Valley business, economic development and real estate development interests and residents concerned about water availability would likely be less satisfied with implementation of Alternative F as compared to the Proposed Action, because of the prospect of less water to serve future development and provide a buffer against drought.

Due to the lower overall volume of groundwater production and the lack of water production from the Snake Valley. Residents of downwind communities are likely to be somewhat less concerned about dust and air quality effects assuming implementation of Alternative F than they would be in conjunction with the Proposed Action.

Conclusion. Construction and operation of the groundwater production and associated future facilities and subsequent pumping and conveyance of groundwater under Alternative F would have a combination of short-term and long-term social and economic effects in the region. The short-term effects would include temporary migration, population influx, housing demand, demands on public facilities and services, and social effects similar to those associated construction of groundwater production facilities under the Proposed Action. The short-term social and economic effects of construction would diminish rapidly, then effectively cease following the completion of construction. Alternative F would avoid most temporary social and economic effects in the Baker/Snake Valley community.

For some interests in Lincoln County and the Las Vegas Valley, the onset of groundwater pumping would be welcomed as an indication that water resources to provide buffer against drought and accommodate economic and population growth would be available. Due to the substantially lower volume of additional groundwater to be developed, interests favoring groundwater development would be less satisfied by development under Alternative F than with the Proposed Action. Other interests would be distressed at the potential for continued growth and development in the Las Vegas Valley at recent levels.

The initiation of groundwater pumping, transbasin water diversions, and long-term drawdown would contribute to political conflict, social dissension, community discord, and personal distress as well as a diminished sense of self-determination and anxiety about the eventual detrimental effects on lifestyle felt by many residents of the rural areas. The long-term effects arising from groundwater pumping and drawdown present risks of significant adverse effects on social and economic conditions in the rural areas, although uncertainty and the decades and centuries long period over which these effects would arise complicate the description and assessment of such effects. Foreseeable impacts include adverse effects of drawdown on local agriculture, outdoor recreation and tourism, and future economic growth and development. Economic development effects would likely be related the perception of the risks of drawdown as well as the actual effects. Potential adverse economic effects including reductions in income and employment in the agricultural and outdoor recreation sectors could generate similar effects in secondary sectors such as retail, service, and government, particularly if these effects resulted in out-migration of population. Any curtailment in future economic development opportunities including second and retirement home development and lifestyle migration would have similar secondary effects. Local governments may experience reductions in revenues from affected industries, which could also result in reductions in service levels. Adverse economic, population, and fiscal effects could in turn generate changes in social organization and community cohesion stemming from out-migration and changes in traditional local industries, occupations and lifestyles. The long-term areal extent and magnitude of drawdown effects under Alternative F would be substantially less than those under the Proposed Action. Alternative F would avoid many of the long-term project-related social and economic effects in White Pine County as they relate to the Baker/Snake Valley community, and in western Juab and Millard counties in Utah, at least for the foreseeable future. However, long-term social and economic effects would arise in White Pine County in conjunction with groundwater development in Spring Valley.

ACMs under Alternative F would be the same as for the Proposed Action.

Proposed Mitigation Measures:

The COM Plan would be implemented for all future groundwater development facilities associated with the GWD Project. Although most of the environmental protection and monitoring and mitigation measures do not relate directly to social and economic conditions, they do relate to environmental resources that indirectly affect those conditions and the quality-of-life of residents and visitors to the area. Consequently, to the extent that COM Plan contributes to avoiding or reducing adverse impacts, it would also represent mitigation for social and economic conditions.

As described in Water Resources, Section 3.3, **GW-WR-3a (Comprehensive Water Resources Monitoring Plan)** would be implemented for sites identified as critical to providing early warning of potential effects to federal resources and federal water rights (see Water Resources, Section 3.3 for complete wording of GW-WR-3a).

As described in Water Resources, Section 3.3, **GW-WR-7 (Groundwater Drawdown Effects to Federal Resources and Federal Water Rights)** would be implemented for federal resources and federal water rights where flow reductions are indicated during the comprehensive monitoring studies. If monitoring indicates that impacts are occurring or likely will occur in the future, the BLM would assess the impacts to determine if an emergency action involving a "Cease and Desist" order on pumping is required or if the development of a mitigation plan is more appropriate. If the BLM determines that a mitigation plan is required, SNWA would prepare a site-specific plan for avoiding, minimizing the magnitude of, or offsetting drawdown effects on federal water resources and federal water rights. The specific mitigation measures may include but are not limited to the following: reduction or cessation of pumping; geographical redistribution of groundwater withdrawals; recharge projects to offset local groundwater drawdown; flow augmentation; or other on-site or off-site improvements (see Water Resources, Section 3.3, for complete wording of GW-WR-7).

Mitigation measures GW-SE-6 through GW-SE-10, as described for the Proposed Action, also would be applied to Alternative F.

Potential residual impacts include:

Implementation of Alternative F would have similar but smaller scale residual social and economic effects than the Proposed Action following the completion of construction and reclamation. The residual effects include a small number of jobs and income in the rural areas.

- Residual effects of groundwater pumping and drawdown would include many of the social and economic effects described above because those effects would arise from the long-term drawdown of groundwater and cannot be reasonably mitigated or avoided because they are inherent with groundwater drawdown. These effects would likely endure beyond the 200-year assessment period.
- Residual social and economic effects in Lincoln County and the Las Vegas Valley could arise in conjunction with growth enabled, but not caused by the water conveyed via the pipeline.
- Residual impacts under Alternative F would be similar to those for the Proposed Action, but affecting a smaller geographical area in the portion of Spring Valley in White Pine County and with little or no residual effects in Snake Valley.

3.18.2.16 Alignment Options 1 through 4

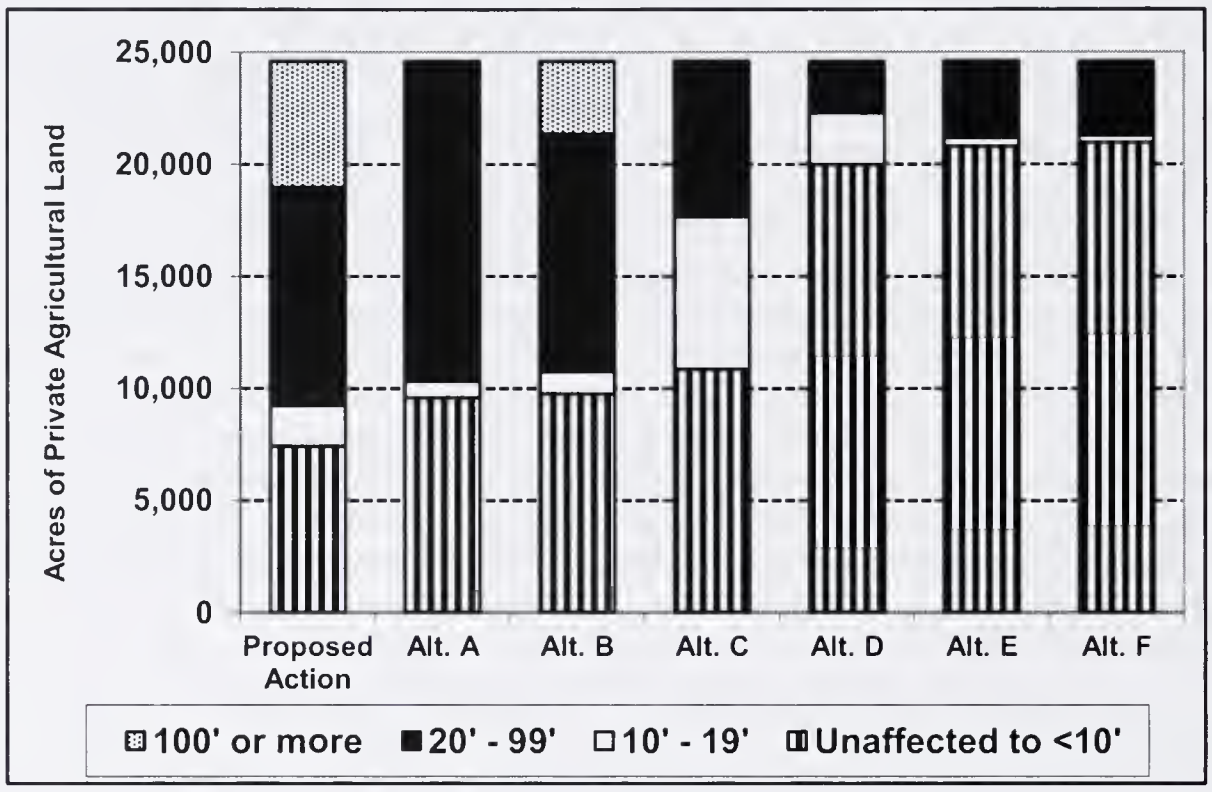
Future facilities development and pumping profiles would be unaffected by the Alignment Options. Therefore, the Alignment Options are not addressed in this section.

3.18.2.17 Alternatives Comparison

Construction, operation, maintenance, and pumping effects associated with the action alternatives would result in relatively minor, but substantial long-term social and economic effects across the socioeconomic study area. Differences between the alternatives would primarily reflect differences in the volume of water pumped and basins in which such pumping would occur. The short-term effects would consist primarily of impacts related to temporary employment and population gains across the region occurring in conjunction with groundwater production well field development. Long-term impacts would result from the indirect effects of groundwater drawdown. **Table 3.18-51**

provides comparative indicators of effects associated with social and economic change in the region for the groundwater development alternatives.

The potential level of drawdown underlying agricultural lands is an important concern in the rural portion of the study area. **Figure 3.18-12** summarizes the potentially affected area based on the hydrology modeling done for this assessment.



Notes:

Drawdown is as compared to the existing groundwater elevation, not the surface elevation.

Affects to agricultural irrigation, individual and community wells located near private agricultural lands, and stock watering facilities may result from drawdown of less than 10 vertical feet from existing groundwater elevation.

Figure 3.18-12 Long-Term Groundwater Drawdown underlying Private Agricultural Lands in Spring and Snake Valleys, Full Build Out Plus 200 Years

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Table 3.18-51 Alternatives Comparison, Groundwater Development Areas and Pumping

	Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Total number of production wells	144 to 174	97 to 117	136	97 to 117	69 to 83	69 to 83	90 to 110
Temporary employment supported (total job-years)	1,613	1,101	1,044	1,101	786	786	1,116
Peak temporary population impact in the rural area during the work week	155	96	109	96	96	96	96
Acres of private agricultural lands in Spring and Snake valleys unaffected or with limited impacts on irrigation costs and production due to projected drawdown of less than 10 feet at full build out plus 75 years	8,808	9,994	10,735	12,241	24,301	20,965	21,257
Acres of private agricultural lands in Spring and Snake valleys at risk for substantial increases in irrigation pumping and well development costs, and decreased production due to projected drawdown of 10 to 50 feet at full build out plus 75 years	7,228	14,465	10,516	12,359	299	3,635	2,741
Acres of private agricultural lands in Spring and Snake valleys at risk for major increases in irrigation pumping and well development costs and reductions in output due to projected drawdown of more than 50 feet at full build out plus 75 years	8,564	140	3,289	0	0	0	642
Annual interbasin water transfer fees, assuming pumping of full volumes (millions)	$1.851	$1.231	$1.851	$0.71 (average)[1]	$0.79	$0.871	$1.231
Acres of public lands identified for potential disposal in Lincoln and White Pine counties overlying area of projected groundwater drawdown of 10 inches or greater at full build out plus 75 years	4,918	4,918	4,918	4,918	107	107	107
Long-term, potentially significant adverse economic and social effects in the rural areas	Yes	Yes	Yes	Yes	Yes. Less severe than Proposed Action	Yes. Less severe than Proposed Action	Yes. Less severe than Proposed Action

[1] Includes fees on 8,000 afy of groundwater presently produced by the SNWA for agriculture use that could be conveyed by the project.

3.18.2.18 No Action

The No Action Alternative describes future conditions in the study area assuming denial of SNWA's requested ROWs. Although Congress mandated that the BLM approve the ROWs, with appropriate mitigation, Congress also mandated the assessment of impacts under the NEPA. The NEPA requires effects under the No Action Alternative be assessed. From a NEPA perspective, denial of the ROW applications would effectively preclude or delay SNWA's plans to develop and convey groundwater associated with its existing and any future rights appropriated to it by the NSE in the five groundwater development basins (Spring, Snake, Delamar, Dry Lake, and Cave valleys) to the Las Vegas Valley. Denial would also preclude or delay the SNWA from providing conveyance capacity to the LCWD, which could hinder that District's ability to develop groundwater to meet its future needs. Denial of the ROW would not directly affect the status of the water rights granted to SNWA by the NSE in Spring, Delamar, Dry Lake, and Cave valleys. However, no substantial development of those rights would be anticipated absent the pipeline.

From a social and economic perspective, the No Action Alternative portrays a scenario under which the future would unfold absent the discrete direct and indirect actions and effects associated with the SNWA's GWD Project. Such a future would itself be contingent upon numerous assumptions, including efforts by the SNWA to identify and develop additional water supplies to support future growth. As discussed in Section 3.18.3 above, the availability of water could enable growth in the Las Vegas Valley, but is not in itself the cause of growth. Consequently, forecasts of population through 2030 prepared by the Nevada State Demographer, Utah Governor's Office and Planning and Budget, augmented by forecasts prepared by UNLV CBER in the case of Clark County, provide a general view of anticipated growth and development in the assessment area for the No Action Alternative. As with any forecast, such a scenario would reflect considerable uncertainty regarding the timing, likelihood, and scale of future influences affecting social and economic conditions in the area.

The discussion of the No Action Alternative addresses other factors that may influence growth and uncertainties associated with those factors while acknowledging that many currently unknown factors and events would likely exert even greater influences on long-term growth and development in the assessment area beyond 2030. Perspectives regarding those influences may vary widely among individuals, groups, and organizations. There are no guarantees that other options could be developed. Some individuals, public entities, and advocacy groups, including the Sonoran Institute (Sonoran Institute 2010), have advocated for the adoption of more stringent conservation and efficiency measures, in combination with actions to limit growth, rather than the development of future water sources. The EIS does not attempt to quantify potential impacts of the No Action Alternative to the economy or population of southern Nevada, assuming no development of additional water supply by the SNWA.

Population and Demographics

State agencies in Nevada and Utah prepare long-term population projections for their respective states. The current forecasts for Nevada, released in 2010 and summarized in **Table 3.18-52**, reflect historical growth trends with consideration of the uncertainty introduced by the recent economic recession, particularly in Clark County. The available projections for the Utah counties date to 2008, before the severity and pervasiveness of effects of the recession and home mortgage crisis were apparent.

Projections prepared by the Nevada State Demographer in 2010 reflect uncertainties regarding the timing and strength of future economic recovery, portraying a range of net population growth between 76,543 and 1.16 million residents in Clark County by 2030. The upper end of the range is nearly 500,000 below the Nevada State Demographer's projections from 2 years earlier.[28] Projections by the UNLV-CBER from 2009 portray a conservative outlook through 2020, but anticipate economic recovery and a resumption of pre-recessionary growth levels thereafter, yielding net population growth of 47 percent through 2030. The UNLV-CBER's projected population of 3,126,000 in 2030 is 328,000 residents lower, or nearly 10 percent, than those it prepared four years earlier.

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[28] Note that the 2010 population reported for Clark County in the 2010 Census is higher than the estimate used by the Nevada State Demographer in preparing the projections. However, it is the net change, rather than the specific value, that is important for the purposes of this assessment.

Table 3.18-52 Population Projections to 2030 for the GWD Project Study Area Counties

County (Source)	2010	2030	Net Change, 2010 to 2030
Clark, Nevada			
Low Job Growth (Nevada State Demographer 2010)	1,902,502	1,979,045	76,543
High Job Growth (Nevada State Demographer 2010)	1,902,502	3,066,872	1,164,370
UNLV-CBER 2009	2,122,000	3,126,000	1,004,000
Lincoln, Nevada			
Nevada State Demographer 2008	4,499	5,500 (e)	1,001
Nevada State Demographer 2010	4,238	4,384	146
White Pine, Nevada			
Nevada State Demographer 2008	10,453	11,440 (e)	987
Nevada State Demographer 2010	9,495	8,259	-1,236
Juab, Utah (Utah Governor's Office of Planning and Budget 2008)	10,519	18,004	7,485
Millard, Utah (Utah Governor's Office of Planning and Budget 2008)	13,863	19,682	5,819

Notes:

These projections were prepared by the Nevada State Demographer, UNLV-CBER, and Utah Governor's Office of Planning and Budget. The Nevada State Demographer projections do not include explicit assumptions regarding future development and population growth associated with the Coyote Spring or Toquop/Lincoln County Land Act projects.

(e) = estimated by the BLM contractor in order to extend the base projections from 2028 to 2030 to provide forecasts for a consistent period.

Sources: Nevada State Demographer 2010; UNLV-CBER 2009; Utah Governor's Office of Planning and Budget 2008.

The pre-recessionary outlook anticipated population growth in the four rural counties to climb by 39 percent, by nearly 15,300 residents, from 39,334 to 54,626 between 2010 and 2030. The vast share of the net growth is projected to occur in Juab and Millard counties and is likely tied to the continued growth along the Wasatch Front. Due to the limited amount of private land and lack of identified economic development opportunities, population growth in Snake Valley would likely be limited, although it is likely that a modest amount of growth would continue to occur around GBNP associated with retirees and others attracted by social, scenic and environmental amenities, and related economic opportunities. Some potentially developable mineral deposits have been identified in western Millard County, which if pursued and proven feasible, could promote growth in the area.

Lincoln and White Pine counties were each projected to gain approximately 1,000 residents in the Nevada State Demographer's 2008 projections. The more recent projections call for lower growth in Lincoln County and population declines in White Pine County. Projected long-term growth in Lincoln County reflects continuation of growth in the southern and central portions of the county linked to Clark County and some retirement/second-home development. Although the projected growth may reflect indirect/spin-off growth related to the Coyote Springs and Toquop/Lincoln County Land Act planned unit development projects in the southeastern portion of the county, the Nevada State Demographer's projections do not explicitly reflect growth associated with these developments. Lincoln County estimates that these developments could ultimately increase local population by 250,000 (Lincoln County 2008). The current economic recession has negatively affected the near-term development and marketing prospects for these developments, with the prospects for future progress dependent on improved economic conditions and the success of developers in attracting businesses and residents. While it is uncertain whether the recession will have long-term residual effects on the development of these projects, they do represent long-term opportunities for growth that are considerably higher than past growth.

No Action as defined for this assessment includes continuation of existing and approved groundwater development and conveyance within Lincoln County, in part to serve Coyote Springs, as well as meet agricultural and municipal needs in the Pioche/Panaca/Caliente area. Groundwater drawdown in excess of 10 feet is projected in and around those 3 communities by 2125. Much of that area would see drawdown in excess of 20 feet by 2250 (see Section 3.3, Water Resources, for additional information regarding the No Action drawdown). The effect on long-term growth in Lincoln

County of the USDOE's decision to withdraw the license application for the Yucca Mountain Nuclear Waste Repository and associated transportation actions is unclear.

White Pine County is desirous of, and is actively engaged in, pursuing appropriate economic development and diversification. Two coal-fired generating plants that had been under consideration for development in White Pine County have been cancelled or put on indefinite hold (Rajala 2009). The current economic outlook for White Pine County includes the continuation of farming and ranching, operation of state correctional facilities, operations of several wind energy farms, and construction activity support by these and other industries. Mining is expected to continue to play an important role in the economy, even as the community faces the foreseeable closure of the Robinson Mine within the next decade. The loss of jobs directly and indirectly associated with the shutdown could result in substantial population exodus from the county, unless the timing of the shutdown coincided with expansion of other existing or new mines in the area.

In White Pine County, as in Clark County, water availability is recognized as essential to the county's economic stability and economic development future. Some residents and officials of White Pine county view SNWA's water right's filings in 1989 as having constrained groundwater applications and new development by any other parties, even though consideration of local community needs is stipulated in the state's water rights processes and SNWA's filings did not preclude other parties from filing applications for water rights. In a decision that some viewed as precedent setting, the NSE's earlier ruling in Spring Valley set aside 10,000 afy for community needs. Although that ruling was subsequently vacated for procedural reasons, the reservation of water for community needs could be seen as removing perceived barriers to filing for within basin use, not just in Spring Valley but also Snake and other valleys as well.

The recent NSE ruling on the Spring Valley applications, set aside 4,000 afy of water in Spring Valley for future in-basin use, 6,000 afy less than in the previous ruling. White Pine County's perspective is that the approved production and exportation of up to 61,000 afy from Spring Valley could effectively constrain some types of future development in White Pine County, although the water thereby reserved augments existing water rights held by White Pine County that could promote long-term economic development and population growth beyond that underlying the Nevada State Demographer's current projections.

The NSE rulings for Delamar, Dry Lake, and Cave valleys set aside 50 afy in each valley. These quantities reflect the NSE's assessment of future needs given limited development potential due to location, limited private land ownership, and other factors.

From a No Action perspective, the long-term economic outlook over the 200-plus year extended period encompassed by the pumping scenarios under the Proposed Action is uncertain. On the one hand, it might be deemed unreasonable to expect that long-term growth would suddenly cease beyond 2020; it could be deemed equally unreasonable to expect growth to continue indefinitely at or near the same rate in the face of water availability issues, climate change, and other potential constraints to growth. Section 3.18.3.1 (Relationship to Induced Growth) provides a discussion of the role of imported groundwater in enabling growth in the Las Vegas Valley.

Given the magnitude of projected population growth in Clark County, it is reasonable to conclude that those projections at least implicitly reflect corresponding economic growth and a lack of constraints to growth, including adequate water supplies to serve future demand. However, realization of the projected growth, given the assumed denial of the ROW grants under No Action, would be contingent on the identification and development of non-GWD Project source(s) of water. Absent a supplemental water source, the timing and level of future population growth in Clark County would be uncertain. In fact, it would be reasonable to expect the Nevada State Demographer and the UNLV-CBER to prepare new long-term forecasts if the No Action alternative were implemented and no other viable sources of water for the Las Vegas Valley were identified. This would be particularly true if the recent drought in the Colorado River system were to continue.

Employment, Labor Force, and Economic Structure

Long-term employment and labor market trends under the No Action Alternative would generally mirror the population trends described above. In other words, the number of jobs and size of the local labor force would be expected to increase over time, although such growth would be limited under one scenario put forth by the Nevada State Demographer. However, short-term fluctuations, including declines, would occur in response to local, industrial,

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national, and even global events and influences. Those short-term fluctuations could manifest themselves as changes in local unemployment rates, labor force migration, and labor force participation.

Under the No Action Alternative, no major long-term changes in economic structure, diversification, or economic dependencies would be foreseen in Clark County. Gaming and entertainment would continue to be the area's economic mainstay, augmented by some specialty manufacturing and financial, engineering, and other types of service firms which take advantage of communications and technology and are not dependent upon access to bulk commodities and natural resources. The residential and commercial construction industries would be important economic cogs in Las Vegas, although the level of activity and employment would likely exhibit cyclic expansion and contraction.

Absent future mineral development, agriculture, tourism, and outdoor recreation would remain the mainstays of the rural economies in western Utah. Tourism and outdoor recreation would also play important roles in the White Pine and Lincoln county economies. Foreseeable changes in economic structure in the rural Nevada counties include renewable energy development, trade and service employment associated with construction and consumer demands linked to the Coyote Springs development, potential specialized produce grown for the Las Vegas market, and residential development tied to a "bedroom" work force for Las Vegas and second-home development. Over the long term, the shutdown of the Robinson Mine, when it occurs, portends a significant restructuring of the White Pine economy.

Foreseeable long-term groundwater drawdown in Lincoln County potentially would increase agricultural production costs, diminish future levels of grazing (see Section 3.12, Rangelands and Grazing), profitability, property values, and increase the cost of operations for public water systems in central Lincoln County.

Local, state, and federal government employment would remain an important source of employment across the entire study area.

Personal Income and Poverty

Future economics and population growth under the No Action Alternative would be expected to result in rising aggregate personal income across the study area. Continuation of historical economic trends and absence of major changes in the structure of the local economies, save that associated with a shutdown of the Robinson Mine near Ely or extended absence of new construction in Clark County, would likely limit any dramatic changes in personal income on a per capita or per household basis. Therefore, current disparities in per capita incomes between Clark County and the rural areas would likely continue and poverty rates would remain below national norms, although per capita income and poverty rates would both be subject to short-term fluctuations in response to local economic events. Lower total and per capita personal incomes among White Pine County residents may result following the shutdown of the Robinson Mine. However, local incomes could benefit from short-term and long-term stimulus associated with future development projects. Temporary incomes supported by construction activities would generally be higher than the average prevailing wages and salaries in the community. The number of long-term jobs, particularly many of those in the trade and services industries, would be lower.

Housing

Future population growth under the No Action Alternative would first absorb the current surplus of housing in the Las Vegas market and then result in corresponding long-term demand for additional rental and owner-occupied housing across the study area. Projected levels of growth in the rural portions of the area would likely also support some modest levels of new residential development. Housing availability and prices would be subject to short-term variability in response to local, regional and national economic conditions.

Public Facilities and Services and Local Government

Clark County and municipal governments, school districts and many other public service providers in the Las Vegas Valley would face increased demand for services requiring major expansions in terms of infrastructure, equipment inventories, and the number of staff. The timing of changes in demand and requirements for additional facilities and services would be a function of the level, timing and geographic location of future residential, commercial, industrial, and public sector development. Aggregate capital outlays and operating costs would climb over time, although outlays on a per capita basis could remain stable, increase or even decline.

In the event that the projected growth and development in Clark County does not materialize, development related revenues that support many intergovernmental transfers statewide, also would not materialize.

County and municipal governments, school districts, and many other public service providers in the rural portions of the study area could also face increased demand for services in response to future growth. While the scale of the service needs may be lower than those in the Las Vegas Valley, governmental agencies and service providers in the rural areas could face their own challenges in meeting needs due to the more constrained financial resources available to them and the lower density of population and demand dispersed over wide geographic areas. In terms of the relative increase in demand for public facilities and services, Lincoln County would face the greatest challenges given the scale of anticipated growth in southern Lincoln County.

Social Organization and Conditions

Under the No Action Alternative, the potential social effects of construction and operations of the pipeline and ancillary facilities described for the Proposed Action and other action alternatives would not occur. Moreover, the ongoing adverse social effects of anticipated groundwater pumping in the rural parts of the assessment area – political conflict, social dissension, community discord, and personal distress – would likely cease, although a residual level of anxiety about future groundwater exportation initiatives would likely continue. Future project-related changes in the social context associated with relocating residents and businesses in the rural areas would not occur. Residents of the rural areas who view the proposed project as providing economic development benefits for Lincoln County would likely be disappointed.

Businesses and economic development interests in the Las Vegas Valley who view the Proposed Action as necessary for continued growth and development would be dissatisfied with implementation of the No Action Alternative, as would residents of the Las Vegas Valley who view the Proposed Action as providing a buffer against future water shortages arising from climate change or long-term drought. It is likely that implementation of the No Action Alternative would result in considerable distress for both of these groups. This distress would be heightened if subsequent drought years on the Colorado River system were to occur. It is likely that SNWA efforts to develop other sources of water would take on higher urgency, as would interest among some residents in examining the implications of water supply on the sustainable levels of growth and development in the Las Vegas Valley.

Environmental Justice

Given that the No Action Alternative represents a continuation of current conditions in the rural portions of the socioeconomic and environmental justice study area, no disproportionate adverse effects of construction and operation of facilities or groundwater pumping affecting low income or minority populations or Indian Tribes would occur. In the Las Vegas Valley, the lack of supplemental water supplies could affect economic conditions particularly in the construction and development sectors, but these effects would be distributed throughout the population and would be unlikely to affect minority and low income populations and Indian Tribes disproportionately.

3.18.3 Cumulative Impacts

This section addresses the potential socioeconomic impact of the SNWA project alternatives when added to the PPAs and RFFAs in the study area that could interact with project alternatives in a manner that would result in cumulative impacts. These PPAs and RFFAs are associated primarily with agricultural, municipal, and public recreational uses, mining, and federal civilian and military activity on federal land holdings in the region.

Cumulative effects of the Proposed Action and alternatives and PPAs and RFFAs on socioeconomic conditions in the study area would potentially arise if the employment, economic activity, population, housing, public service demand, and fiscal aspects of RFFA projects occurred concurrently with those of the Proposed Action and alternatives. Cumulative socioeconomic activities could also occur if activities or land use associated with RFFAs occupied or proposed to use the same surface or subsurface areas as the Proposed Action and alternatives. Cumulative socioeconomic impacts have the potential to be both beneficial and adverse.

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007).). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Socioeconomics and Environmental Justice

Climate change effects were not evaluated for this resource because potential effects to socioeconomics and environmental justice as a result of climate change cannot be directly quantified.

3.18.3.1 Issues

Rights-of-way and Groundwater Development Area Construction and Maintenance

- Potential cumulative short-term indirect socioeconomic effects on local communities arising from concurrent temporary employment, population, and traffic increases and the associated demands on temporary housing, public facilities and services, and emergency services during construction.
- Potential cumulative long-term indirect socioeconomic effects on local communities arising from job and population growth associated with operations of cumulative projects, demand on housing, public facilities and services, and emergency services during operations.
- Potential cumulative short- and long-term indirect effects on grazing, outdoor recreation, tourism, and other elements of the economy due to short and long term disturbance, changes in access, and visual effects.

Groundwater Pumping

- Potential cumulative short-term indirect socioeconomic effects on local communities arising from concurrent temporary employment, population and traffic increases and their associated demands on temporary housing, public facilities and services, and emergency services during construction.
- Potential cumulative short and long-term indirect effects on grazing, outdoor recreation, tourism, and other elements of the economy due to short and long term disturbance, changes in access, and changes in the landscape and visual resources arising from the effects of groundwater pumping.
- Potential cumulative effects from pumping on economic and social conditions in the rural areas.

3.18.3.2 Assumptions

- The schedule and progression of development and direct employment associated with the construction and operations of the GWD Project would be as described in Chapter 2.

Approach: The assessment of potential cumulative socioeconomic effects is of necessity qualitative and descriptive due to the limited information available for the RFFA in terms of timing, location, project design/capacity, and anticipated construction and operations employment levels.

3.18.3.3 Methodology of Analysis

Influence Area: The influence area for cumulative socioeconomic effects includes the southern portion of White Pine County, Lincoln County, the western portion of Millard County, Utah, and the northern portion of Clark County, including the Las Vegas Valley.

Time frame: **Short-term** -- 5 years or less, and is generally applicable to the construction of the main pipeline, ancillary facilities, and the development of the groundwater production well fields and future facilities. **Long-term** -- is longer than 5 years, and is applicable to the operations and maintenance of the physical systems (tier 1) and to the pumping effects (subsequent tiers). Long-term time frames arise primarily in conjunction with the latter and would extend more than 200 years into the future.

3.18.3.4 Cumulative Effects – Past and Present Actions for All Alternatives

The SNWA's project would be located almost entirely on federal lands administered by the BLM, and more than 90 percent of the land surface in White Pine and Lincoln counties is under federal management. Historically and economically important segments of the region's economic base include agriculture, travel and tourism, outdoor recreation, mining, and federal civilian and military activity on the Nevada Test Site, at the GBNP, and other federal land holdings in the region. The GWD Project area is sparsely populated. A substantial portion of Clark County is also rural and undeveloped. Clark County's character however, is defined largely by the urbanized Las Vegas metropolitan area.

Two major U.S. highways, Highway 93 running north and south through the Nevada portion of the influence area, and Highway 6/50 running east and west across White Pine County, serve the GWD Project area. Nevada State Route 318 (SR318) generally runs north-south through the western portion of White Pine and Lincoln counties, connecting Ely and Alamo and passing through the communities of Preston, Lund, and Hiko. SR318 does not pass through any of the five proposed GWD production basins. Interstate I-15 runs diagonally through Clark County just south of the study area, connecting Las Vegas and Salt Lake City. A segment of the Union Pacific Railroad mainline network extends diagonally through southern Lincoln County and central Clark County, passing through Caliente.

Past actions include public land disposal actions by the BLM, several of which have accommodated substantial levels of new development in Clark County since 2000. Other land disposal actions have been completed, but not yet fully developed such that the future development remains a RFFA. The effects of past and current development in the region are evident in the existing settlement patterns, physical development and infrastructure, fiscal structures, and social settings. Such development and the related activities, events, and people associated with it imbue the area with a rich heritage and cultural history.

The collective past development activity contributed to growth and development that underlies important economic and social conditions and trends in the area. These trends are differentiated between the rural and urban areas; the rural areas had been marked by limited long-term population growth and economic expansion, punctuated by periods of cyclical expansion and decline, while the Las Vegas metropolitan area was characterized, until recently by rapid growth and development. The differences in these development trends were often manifest by unemployment rates in the rural areas that were higher than those in the Las Vegas area, while incomes were lower. The rapid population and job growth in Clark County provided the impetus for new residential and commercial development and expansion of local government infrastructure and services. The Las Vegas economy was among the metropolitan areas most adversely affected by the recession and the housing mortgage foreclosure crisis. Consequently, unemployment rates rose to among the highest in the nation. The rural areas were also affected, though not as dramatically, such that unemployment rates in the rural areas were lower than in Clark County.

The proposed action and alternatives would occur in the socioeconomic context and setting described above. The PPAs helped create a setting based largely on natural resources in the rural areas, and gaming, entertainment, and business and government services in Las Vegas. That difference underlies another important dimension related to cumulative effects, which is the comparative capacity of the communities to accommodate growth. The availability of labor, housing resources, community infrastructure, and local government capacity in Las Vegas can more readily accommodate temporary demands associated with construction projects. Labor, housing, and service capacity is more limited in the rural areas. Consequently, cumulative effects of past and present socioeconomic conditions, when combined with the Proposed Auction and alternatives, are likely to be mainly beneficial in the metropolitan area, whereas the potential for both adverse and beneficial effects is more prevalent in the rural areas.

Social effects of development also have occurred and natural resource development has resulted in some conflict between the extractive (mineral and energy resource) industries and recreation, tourism, and grazing on public lands.

3.18.3.5 Cumulative Analysis – Pipeline and Ancillary Facility Construction and Operation

Multiple linear ROWs, pipelines and transmission lines, conventional and renewable energy and water development projects, land disposal and land development, and other activities are reasonably foreseeable in the area. The construction of one or more reasonably foreseeable renewable energy, transmission line, or land development projects would be accompanied by an increase in temporary employment, along with demands on housing, community services, and social conditions in nearby communities that could interact with similar effects related to the Proposed Action or alternatives. The timing of RFFA development is an important factor in assessing the potential for cumulative socioeconomic effects. Consequently, the following assessment of cumulative effects uses the project's development schedule as the primary organizing element. This cumulative analysis includes a broader range of foreseeable projects than those listed in Chapter 2 to provide a larger range view of future development.

3.18.3.6 Proposed Action, Alternatives A through C

The potential for short-term cumulative effects arises when one or more of these projects is to be located in or near the pipeline or power line corridors or groundwater exploratory areas and the construction or operating schedules overlap with the construction schedule for the SNWA's project. Potential short-term cumulative effects include the influx of temporary construction workers, demands for temporary housing, and short-term demands on law enforcement, emergency medical services and other public facilities and services. The extent of the effects would depend on the scale of the workforces of the respective projects, the locations of active worksites relative to one another and to nearby communities, and the timing and duration of concurrent development. Concurrent development of multiple projects, each located in the more rural settings near the project, could increase the potential for beneficial economic and fiscal effects but could also increase the potential for adverse cumulative effects.

Lincoln and White Pine county governments may experience increased short-term pressures on fiscal resources to meet demands. Revenues generated by the projects, including temporary increases in sales and use taxes, that flow through to local governments would help offset some or all of the added expenditures, although jurisdictional and timing mismatches in terms of revenue generation and the costs incurred, could also occur.

Short-term social effects could include community disruption were large numbers of construction workers to reside in the same communities concurrently. Additional short and long-term dissatisfaction may occur for residents and visitors who value undeveloped open space and natural environments, and thus would view the cumulative development as detrimental to wildlife habitat, undeveloped landscapes and scenic resources. Individuals who view these other projects as harbingers of economic development and sources of energy to meet rising demand would generally see concurrent development in a more favorable light.

Construction of the proposed Tier 1 project facilities is anticipated to begin in Clark County and then proceed from south to north, with substantial construction occurring in Clark County and southern Lincoln County during the first five years. Thereafter, project-related construction would be concentrated in central and northern Lincoln County for 3 years, before shifting into White Pine County.

Based on the schedule outlined above, potential temporary effects could occur in Clark County in conjunction with the following:

- Construction of the ON Line transmission line and Zephyr transmission line in the southern LCCRDA corridor, and the Eastern Nevada Transmission Line in the Apex area;
- Industrial development, including any conventional or renewable energy generating project built in Coyote Springs and elsewhere in northeastern Clark County; and
- A resurgence of general residential, commercial and public sector development in the Las Vegas Valley in the next 4 to 5 years.

The construction of such projects would typically involve temporary and short-term demands on labor, housing and public facilities and services, drawing on resources in the Las Vegas Valley, and potentially in Moapa, Logandale and Mesquite. These effects would likely be perceived as beneficial. Land use in the area around the southern terminus of the SNWA's project is industrialized, including existing transmission lines, substations and interconnections, a power generating station, rail line and I-15. The project's contribution to these effects would be minor given the size of the metropolitan economy.

Opportunities for cumulative effects to arise in conjunction with other linear systems would continue as project construction moves northward into northern Clark County and southern Lincoln County. Potential cumulative effects would be similar to those described above and would depend on the relative scale of the cumulative projects and the location and duration of concurrent development. The Las Vegas Valley would continue to serve that support role for a time, but eventually the demand would shift northward to Alamo and potentially to the Moapa area. Alamo offers limited support capacity, giving rise to a relatively high potential for adverse cumulative socioeconomic effects, especially for housing, law enforcement, and emergency medical services.

Temporary cumulative effects, such as temporary population gains and demands on public facilities and services, could also occur in conjunction with the construction of other linear systems if independent changes in project development schedules resulted in concurrent activity in the same general area of the region.

A resumption of residential and commercial development activity at the Coyote Springs Development during the time when the GWD Project proceeds through the area could contribute to temporary cumulative socioeconomic impacts in Alamo, Moapa, and the Las Vegas Valley. Short-term, potentially significant cumulative socioeconomic effects could arise in Alamo, Moapa and other communities if construction of a major renewable energy facility at Coyote Springs were to occur concurrently with construction of the SNWA's main pipeline and transmission line. Cumulative effects could also arise in conjunction with future groundwater development, but the duration and scale of potential project-related effects limits their contribution to the overall effects. Past and future development of the Coyote Springs project is altering the character of the Coyote Springs Valley, creating a large-scale suburban community in what has historically been a rural, relatively undeveloped area. Existing land use in the area includes a sand and gravel mine and several utility corridors. Potential cumulative social effects associated with this segment of the ROW could include increased dissatisfaction among some residents and repeat travelers/visitors to the area due to the increased presence of development in and through the valleys.

As construction of the SNWA's project moves northward into central Lincoln County, opportunities for cumulative effects would arise primarily in conjunction with temporary construction activity associated with other linear facilities, renewable energy projects, BLM resource management, and land disposal actions. Based on location, highway accessibility, and availability of temporary lodging and retail and dining/recreation establishments, the largest share of any effects would likely occur in Caliente, although Alamo, Pioche and Panaca could also be affected.

The GWD Project construction would next move into Spring Valley in southern White Pine County. Potential for cumulative effects would arise primarily in conjunction with renewable energy projects (mostly wind energy) and the associated linear transmission systems. Cumulative long-term social effects associated with this segment of the ROW include increased dissatisfaction among some residents and repeat travelers/visitors to the area due to the increased presence of development in and through the valleys. Cumulative development activities in Spring Valley also would

result in an increased sense of dissatisfaction for some residents/property-owners in the valley, who value the current combination of open space and agricultural settings.

The final phase of the GWD Project construction would occur in Snake Valley in southeastern White Pine County. Although direct construction would not occur in Millard County, Utah, the community of Garrison and nearby unincorporated areas in Snake Valley would experience indirect effects, e.g., increased vehicular traffic on local roads. Identified potentials for cumulative socioeconomic effects are fewer in this area than elsewhere, but could include future management actions by the BLM, USFS, and NPS, and development activities in western Millard County. Were concurrent activities to occur, the associated social and economic effects would most likely affect the Baker/Snake Valley community. Depending on the scale and duration of the activity, the short-term economic and social effects may be viewed as beneficial, although social disruption associated with the presence of temporary workers in the community and potential indirect effects on tourism also could occur.

Potential cumulative effects on grazing and outdoor recreation may occur across the entire ROW. Short-term effects due to temporary loss of or degradation of forage, disruption of access, and disruption of livestock access to water could occur from concurrent construction activity on two or more projects in the same area. Following construction, the potential for such effects would diminish, although some effects may persist for the long-term pending completion of reclamation and as a result of the additional physical presence of facilities in areas that are presently largely undeveloped.

Most cumulative effects related to construction typically disappear within a short time following the completion of construction. Potential residual effects include any new private or public infrastructure, including housing put in place to respond to demands associated with the temporary growth.

Potential long-term cumulative effects on economic and population growth and indirect effects on housing, public facilities and services and social conditions involving operations and maintenance of the SNWA groundwater facilities would be limited due to the small size of the SNWA's operating staff; perhaps as many as 20 individuals. Each of the RFFAs would likely have a number of permanent jobs associated with them, contributing to overall job and population growth over time. The jobs and resident population associated with the Proposed Action and Alternatives A through C could interact with such growth; however, the project's contribution to the overall long-term growth would be limited.

3.18.3.7 Alternative D

The potential for short-term cumulative socioeconomic effects associated with the pipeline and ancillary facility development and maintenance under Alternative D would be the same as under the Proposed Action and Alternatives A through C for the first 7 years of project development. Potential cumulative social and economic effects associated with construction activities in the Spring Valley portion of White Pine County and in Snake Valley would not occur under Alternative D, with the differences in potential adverse and beneficial effects accruing primarily to Ely and Baker/Snake Valley.

The long-term operations and maintenance requirements associated with the pipeline and ancillary facilities under Alternative D would be virtually the same as those with the Proposed Action. Consequently, potential long-term cumulative effects under Alternative D would be comparable to those from with the Proposed Auction, and could interact with growth from other projects. However, the project's contribution to the overall long-term growth would be limited.

3.18.3.8 Alternatives E and F

The potential cumulative effects associated with the pipeline and ancillary facility development and maintenance under Alternatives E and F would be the same as under the Proposed Action and Alternatives A through C for the first 8 years of project development. Potential cumulative effects associated with construction activities in the Snake Valley would not occur under these alternatives, with the differences in potential adverse and beneficial effects accruing primarily in Baker/Snake Valley.

The long-term operations and maintenance requirements associated with the pipeline and ancillary facilities under Alternatives E and F would be virtually the same as with the Proposed Action in Spring, Delamar, Dry Lake, and Cave valleys. Consequently, potential long-term cumulative under effects under Alternatives E and F would be comparable

to those from with the Proposed Action in Spring, Delamar, Dry Lake, and Cave valleys, and could interact with growth from other projects. However, the project's contribution to the overall long-term growth would be limited.

3.18.3.9 Conclusion

The highest potential for adverse short-term cumulative social and economic effects arising in conjunction with development of the groundwater production activities would occur in southern and central Lincoln County and the Moapa area in years 4 and 5 of the SNWA's GWD Project development schedule, when the project's construction work force would be at its peak. The potential long-term cumulative effects involving the SNWA groundwater facilities would be limited, as would the project's contribution to those impacts.

3.18.3.10 Cumulative Effects – Groundwater Development and Pumping (subsequent tiers)

Groundwater Production Facilities – All Alternatives

Groundwater production wells proposed in 5 hydrographic basins would collectively supply the water to be conveyed by the main pipeline. The groundwater pumping scenarios defined for the hydrology analysis assume these wells would be developed in 3 or 4 distinct periods; years 5 thru 8 in the Delamar, Dry Lake, and Cave valleys, years 14 thru 16 and 31 thru 33 in Spring Valley, and 36 thru 38 in Snake Valley.

Development of the production wells, power lines, water collection lines, and roads involves a series of short-term, temporary construction-type activities that create opportunities for cumulative socioeconomic effects in nearby communities. Based on proximity to the targeted hydrographic basins, the communities potentially affected by short-term cumulative socioeconomic effects include Alamo, Caliente, Panaca, and Pioche in conjunction with the Delamar, Dry Lake, and Cave valleys, Panaca, Pioche, Caliente, Ely, and Baker/Garrison in conjunction with the Spring Valley development, and Ely and Baker/Garrison in conjunction with the Snake Valley developments.

Temporary direct and indirect employment and population effects associated with wellfield development are described in Section 3.18.3 above and would be lower in magnitude than those associated with pipeline development. Unlike construction of the main pipeline, which continually advances along the ROW route, development of the groundwater production wellfields would occur within a specific basin, and may be more spatially dispersed within the basin. As a result, the potential for concurrent development and cumulative effects would arise as the construction of other linear-type facilities moves through an area, or in conjunction with the construction and operation of a more land intensive, fixed location facility, e.g., a mine or solar powered generating facility. The maximum duration of cumulative effects would be defined by the duration of groundwater wellfield development activity, although it could be much shorter.

No specific instances of concurrent development have been identified given the currently available information regarding the RFFAs. Consequently, the potential for cumulative effects related to the groundwater production wellfields is limited. Given the scale of effects associated with such development, the potential for substantial cumulative effects to arise in which the contribution of the proposed development would be a major contributor is low. Using the number of wells to be completed as an indicator of development intensity, the relative potentials for cumulative effects would be highest with the Proposed Action, followed by Alternative B, Alternatives C and A, then Alternatives F and E, and finally Alternative D.

3.18.3.11 Pumping Effects – All Alternatives

Completion of the main pipeline, ancillary facilities, the groundwater production wellfields, and other future facilities would facilitate the long-term pumping and conveyance of water from Lincoln County and in some cases, from White Pine County. The assumed volume of groundwater to be pumped would increase over time as additional wells are completed, until the maximum quantity for each alternative is reached (see Chapter 2). The pumping would result in long-term groundwater drawdown, affecting vegetation, seeps and springs, and surface users who pump water. Some of those effects have potential long-term social and economic implications. Pumping associated with the proposed project and alternatives would interact with groundwater pumping for other existing and future use in these same basins (see Chapter 2), creating cumulative effects. Pumping as part of the Proposed Auction would also contribute to potential cumulative effects at the regional level because of subsurface hydrologic connections between basins.

The hydrology modeling done for this assessment assumed certain levels of continuing and cumulative groundwater development. Results of that analysis show both long-term expansion of the geographic area affected by drawdown and an increase in vertical drawdown over time. The results show contributions to the cumulative effects ranging from

negligible to moderate in basins other than the production basins. In the Spring and Snake valleys, pumping associated with current agricultural uses in the area is a contributing factor to the drawdown.

From a socioeconomic perspective, it is important to recognize that the groundwater, surface water, and environmental changes that may drive cumulative socioeconomic effects would develop over a very long period, with pumping by the SNWA not beginning for decades in some areas. The extended periods (50 plus years) over which drawdown effects propagate before reaching significant levels proximate to communities or the agricultural areas in Spring and Snake valleys, limit meaningful analysis of cumulative social and economic effects from drawdown. Given the limitations, two sets of results from the hydrology analysis are used as indicators of the potential cumulative effects: 1) the area and extent of long-term drawdown underlying agricultural lands in Spring and Snake valleys and 2) the area of drawdown relative to public lands identified for potential disposal in White Pine and Lincoln counties.

Foremost among such effects, from a social and economic perspective, would be potential adverse impacts on agricultural users in Spring and Snake valleys who rely on groundwater for irrigation, livestock watering, and domestic potable water needs. These and other ranchers also rely on grazing on public lands in other hydrographic basins that could be adversely affected by changes related to pumping. Cumulative drawdown effects could result in reduced agricultural production and higher farm operating costs. Other potential long-term effects include impacts to public water systems, and long-term indirect effects on outdoor recreation, including OHV use and hunting, and on tourism due to changes in recreational setting or viewsheds.

Potential cumulative indirect effects associated with drawdown, such as changes in vegetation, would also occur over extended periods. The hydrology analysis estimated that approximately 1,654 acres of private agricultural lands in Spring and Snake valleys would be affected by 10 feet or more of drawdown by full build out plus 75 years (about the year 2125) under the No Action Cumulative scenario. Under the Proposed Action cumulative scenario, the total area of affected private lands would increase by 14,252 acres, with drawdown of 50 to 99 feet projected under nearly 9,900 acres (**Table 3.18-53**). The contribution of the project to the cumulative drawdown would be substantial. The extent of the drawdown would be greater under the Proposed Action and Alternative B than under the other alternatives. Such drawdown would encompass more than half of the privately owned agricultural lands in central and northern Lincoln County and southeastern White Pine County, and include agricultural lands and the community of Garrison in the southwestern portion of Millard County. The hydrology results suggest that the community of EskDale and nearby agricultural lands would not be impacted by severe drawdown. Under Alternative D, the total affected area would increase to 3,024 acres during the same time period; nearly double that under the No Action Alternative, but substantially less than under the Proposed Action.

Table 3.18-53 Private Agricultural Lands in Spring and Snake Valleys Affected By Long-Term Drawdown, Full Build Out Plus 75 Years, Cumulative Scenarios (Acres)

Projected Drawdown	No Action	Alternative						
		Proposed Action	A	B	C	D	E	F
Unaffected to <10'	22,946	8,622	9,657	10,428	10,987	21,576	20,699	20,982
10' - 49'	1,654	6,091	14,003	10,222	13,613	3,024	3,253	588
50' or more'	0	9,887	940	3,950	0	0	647	3,030
Total Affected Acres	1,654	15,978	14,943	14,172	13,613	3,024	3,901	3,618
Change in Affected Acres Over No Action	NA	14,252	13,289	12,518	11,959	1,370	2,247	1,964
Percent of Total Agri. Land Affected	7	65	61	58	55	12	16	15

Notes:

Drawdown is relative to the current groundwater elevation, not surfaee elevation.

In some instanees, impaets to agricultural irrigation, individual and eommunity wells located near private agricultural lands, and stock watering faeilities may result from drawdown of less than 10 vertical feet.

Under the cumulative development scenarios, the Proposed Action and Alternatives A and B would be major contributors to cumulative drawdown that would be substantially more severe than the direct effects.

Another indicator of potential cumulative effects would be the level of projected drawdown underlying public lands identified for potential disposal in the study area. One objective for such disposals is to support community and economic development in the region. Drawdown of groundwater underlying these lands could undermine the utility and value of such lands to meet that objective, due to long-term uncertainties regarding water availability.[29]

Approximately 51,600 acres of public lands have been identified for potential disposal within the project area. Most of these lands are not located in the same areas as the agricultural lands, i.e., not in Spring and Snake valleys. Nearly 22,000 acres, 43 percent of these lands, are located such that they would be unaffected by drawdown of greater than 10 feet by groundwater development associated with actions under the actions included in the No Action Cumulative scenario (see **Table 3.18-54**).

Table 3.18-54 Public Lands Identified for Potential Disposal Overlying Project Groundwater Drawdown of 10 Feet or Greater at Full Build Out Plus 75 Years, Cumulative Scenarios (Acres)

		Alternative						
Projected Drawdown	**No Action**	**Proposed Action**	**A**	**B**	**C**	**D**	**E**	**F**
Unaffected to <10'	21,989	3,935	3,935	3,935	3,935	9,404	8,754	8,754
Total Affected Acres	29,612	47,666	47,666	47,666	47,666	42,197	42,847	42,847
Change in Affected Acres Over No Action	NA	18,054	18,054	18,054	18,054	12,585	13,235	13,235
Percent of Total	**57**	**92**	**92**	**92**	**92**	**82**	**83**	**83**

Note: Drawdown is relative to the current groundwater elevation, not surface elevation.

Adding in the effects of pumping associated with the Proposed Action substantially increases the extent of affected lands over time. At full build out plus 75 years, the acres of potential disposal lands overlaying areas unaffected by drawdown of 10 feet or more falls to less than 4,000 acres, while the affected areas increase to nearly 47,700 acres or; 92 percent of all such lands in the study area. Alternatives D, E, and F also would contribute to long-term increases in total affected lands, but would affect approximately 5,000 fewer acres.

Although the social and economic implications of the drawdown underlying public disposal lands are unclear, the drawdowns represent potential cumulative adverse effects of pumping, localized within the rural areas. There may be some offsetting effects if water conveyed under the cumulative scenarios enable growth and development on some of the public lands, but an analysis of such trade-offs is beyond the scope of this analysis.

3.18.3.12 Conclusion

Cumulative groundwater drawdown effects would intensify the effects on social organization and conditions that would occur in the rural portion of the assessment area and in communities along the Wasatch Front under the Proposed Action and other alternatives. These impacts would materialize over time and likely would be irreversible within any reasonable period of time as viewed from the perspective of an individual or family.

The effects of groundwater production facilities and pumping associated with the Proposed Action and alternatives would contribute to long-term cumulative changes in social and economic conditions in the study area. The potential for cumulative effects and the groundwater pumping projects' contributions to such effects are both largely a function of the annual volume of water to be pumped for the Proposed Action and Alternatives A through C. Volume is an important factor in Alternatives D, E, and F as is the geographic location of pumping within Spring Valley.

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[29] The Nevada State Engineer considers future economic and community development needs during hearings to grant applications for water rights. However, the extent to which that consideration accounts for future needs associated with potential future lands disposals is unclear.

3.19 Public Safety and Health

3.19.1 Affected Environment

3.19.1.1 Overview

The public safety and health section addresses project activities that may pose health and safety risks to users of public and private lands in the immediate vicinity of project facilities. Based on this definition, the EIS study area includes the main line pipeline system and ancillary facility ROWs, and facilities within the proposed groundwater development areas that include groundwater drilling pad sites, access roads, gathering pipelines, and electrical distribution lines (**Figure 3.0-1**). Also included are the transportation routes required for delivery of hazardous materials (e.g. equipment fuel and delivery of water treatment chemicals).

This section describes the following:

- Hazardous materials and waste:
  - The regulatory definitions for transporting and storing hazardous materials required for construction and for disposal of construction solid waste; identification of the types of project hazardous materials.
  - The potential for encountering existing sources of human-caused soil and water contamination during construction.
- Noise:
  - The definition of noise; the background noise environment in the areas where pipeline and ancillary facilities would be constructed; and where long term noise-generating equipment (pump stations) would operate. The nearest noise sensitive locations (residences, schools, churches, special management areas) to these noise generation sources are identified.
- Pipeline design and construction:
  - The design and construction standards for water pipelines to ensure safe operation.
  - Pipeline operational safety and potential consequences of pipeline water releases.

Other health and safety hazards and risks are discussed in the following sections:

- Project-related dust generation and combustion emissions are discussed in Section 3.1, Air and Atmospheric Values.
- Risks of damage to pipeline and ancillary facilities from earthquakes and fault movement are discussed in Section 3.2, Geologic Resources.
- Project noise effects to wildlife are discussed in Section 3.6, Terrestrial Wildlife.

3.19.1.2 Right-of-way and Ancillary Facilities

Hazardous Materials and Waste

"Hazardous materials," which are defined in various ways under a number of regulatory programs, and "hazardous waste" can represent potential risks to both human health and the environment when not managed properly. Hazardous materials and hazardous wastes are further defined in **Appendix F3.19**.

The following major databases were reviewed to identify potential sites of hazardous material releases or solid waste activities located near the proposed project areas: Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); National Priorities List, Enforcement and Compliance History Online; Envirofacts Data Warehouse (USEPA 2009a); and NDEP Project Tracking Database. Descriptions of these databases are provided in **Appendix F3.19**.The following lists provide information regarding management requirements during transportation, storage, and use of particular hazardous chemicals, substances, or materials:

- The Superfund Amendments and Reauthorization Act Title III List of Lists or the Consolidated List of Chemicals Subject to Emergency Planning and Community Right-to-know Act and Section 112(r) of the CAA (USEPA 2006a).
- The USDOT listing of hazardous materials in 49 CFR 172.101.

Pursuant to regulations promulgated under CERCLA, as amended by Superfund Amendments and Reauthorization Act, release of a reportable quantity of a hazardous substance to the environment must be reported within 24 hours to the National Response Center (40 CFR Part 302). NAC 445A.347 also requires immediate reporting of a release of a reportable quantity of a hazardous substance to the Nevada Division of Emergency Management. In addition, under the State of Nevada Water Pollution Control Permit program, all releases of a reportable quantity must be reported as soon as possible, but not later than 24 hours after the event, to the NDEP Bureau of Corrective Actions.

Hazardous materials that are not entirely used or applied may become hazardous waste. Solid waste consists of a broad range of materials that include garbage, refuse, wastewater treatment plant sludge, non-hazardous industrial waste, and other materials (solid, liquid, or contained gaseous substances) (USEPA 2006b). In Nevada, solid waste disposal is regulated under NAC 444.570-444.7499; disposal of hazardous waste is regulated under NAC 444.850-444.8746. Nevada regulates the storage and handling of certain defined "highly hazardous substances" under NAC 459.952-459.9542.

Fuels and lubricants would be the primary hazardous materials of concern, in terms of volumes stored and used during construction. Other minor amounts of hazardous materials or substances also may be present during construction, and would be subject to the reporting, handling, and hazard communication requirements in the various regulatory programs described above.

The types of solid waste generated during the construction phase include wood, concrete, metal, petroleum products, and chemical waste such as sealants and adhesives.

During operation of the project most of the hazardous materials would be used at the pumping stations and the water treatment facility. Materials at pump stations would include diesel fuel for back-up generators, biocides, and water treatment chemicals to be determined (SNWA 2011). The water treatment facility would also consume water treatment chemicals including chlorine compounds, corrosion inhibitors, and other chemicals to treat specific water quality characteristics that will not be determined until specific water sources are tested. Mineral oil would be used for transformers, switches, circuit breakers, capacitors, and other electrical equipment at new or upgraded electrical substations. Hazardous materials used for well maintenance would be brought to and removed from the site by maintenance personnel and not stored on-site for extended periods.

Operation and maintenance would generate solid waste similar in composition to that of construction activities, but in much smaller quantities. Operation and maintenance are not expected to generate hazardous waste on a regular basis. Hazardous waste generation would be occasional and in small amounts.

Noise

Noise is generally considered to be unwanted sound (Federal Transit Administration 2006). Sound is what is heard when ears are exposed to small pressure fluctuations in the air. Sound generated by the vibration of objects moves through the air in waves. Noise can be described in terms of three variables: amplitude (loud or soft); frequency (pitch); and time pattern (variability).

- Amplitude. Sound pressure or energy is the magnitude of the sound heard by the ear. This magnitude ranges from low energy (soft) to higher energy (loud). Loudness is expressed in decibels (dB).
- Frequency. Sound is a fluctuation of air pressure. The number of times the fluctuation occurs in one second is called its frequency. Frequency is quantified in cycles per second, or Hertz. Human hearing sensitivity generally ranges between 20 and 20,000 Hertz. Human hearing does not respond equally to all sound frequencies. Therefore, a portion of the sound frequency range (A-weighted) is used to define what humans can normally hear.
- Time pattern. Noise is usually generated by a variety of distant background sources, both natural and human. The amplitude and frequency of these noise sources vary constantly, but may fall within a narrow range, particularly in rural areas where there are few human noise generation sources. Periodic short-term increases in background noise can occur from nearby noisy sources, such as vehicular traffic.

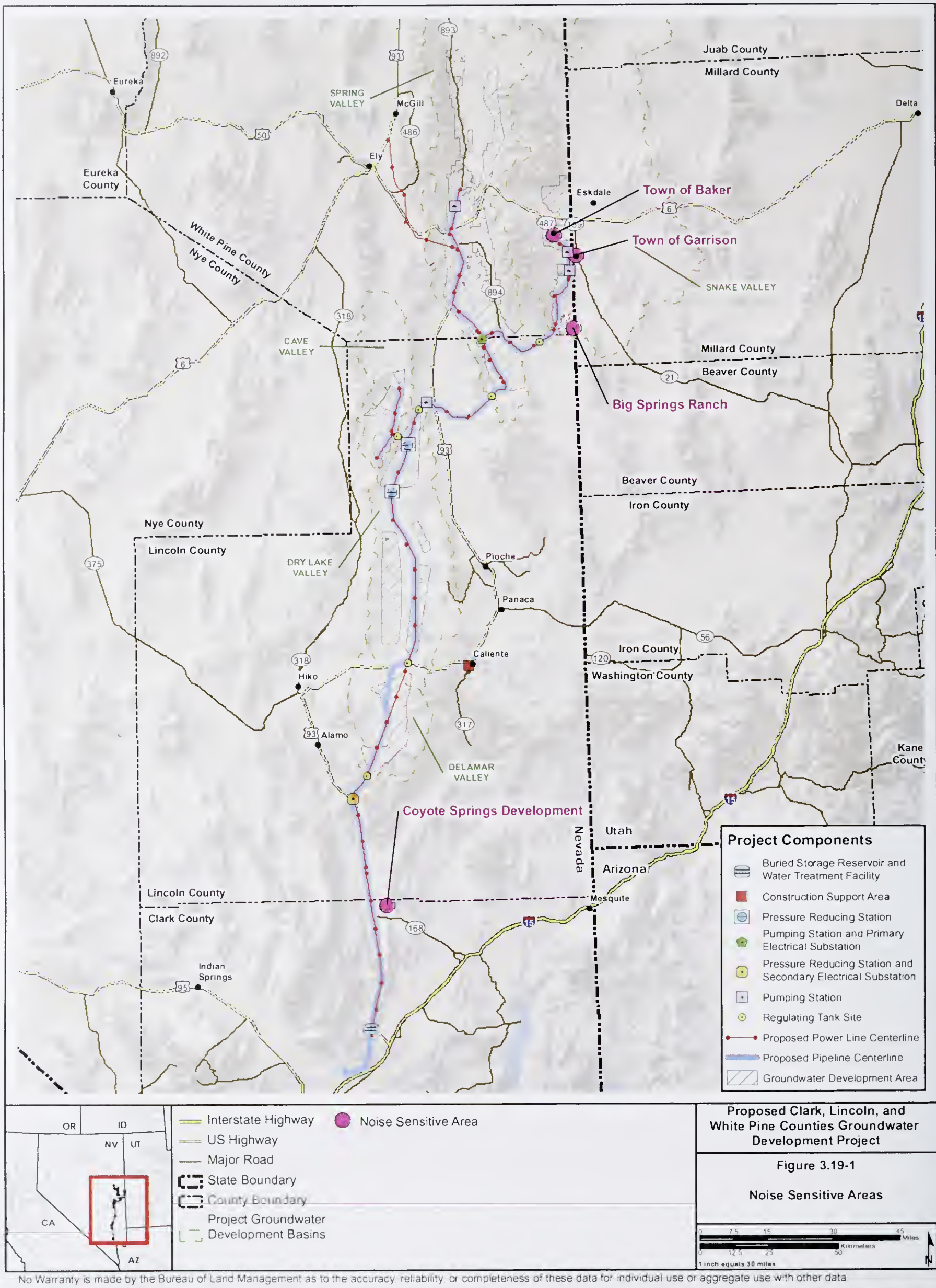
Generally, outdoor noise levels within the project study area are low due to the rural nature of the area. Noise can be generated from wind, animals, humans, transportation, and construction activities. Noise levels may vary markedly within the project area, with noise levels as low as 30 – 40 dBA (decibels A-weighted scale) in wilderness areas to 85 – 90 dBA in urban areas and along major highways.

A guideline standard of a day-night level of 55 dBA was established as a threshold by the USEPA (1974) to protect residential areas from activity interference and annoyance. This standard has been widely used to regulate noise levels for stationary industrial sources, but can vary by state. For mobile sources and short-term construction, the NDOT follows the Federal Highway Administration's noise standard as outlined in the 23 CFR 772 "Procedures for Abatement of Highway Traffic Noise and Construction Noise".

Noise would be generated by excavation and grading equipment during the construction of the pipeline system and ancillary facilities, and during pumping station operation. As stated in Section 3.8, Land Use, the proposed pipeline ROWs and ancillary facilities would be located almost entirely on BLM lands. Aerial photos and other sources were examined to determine the locations of nearby residences, or other public gathering locations (e.g. schools, churches, scenic viewpoints) near (up to 2 miles) from project ROW and pumping station facilities.

The proposed pipeline, power lines, and pump stations would be located near the following locations or communities (**Figure 3.19-1**):

1. Coyote Springs residential development (vicinity of the intersection of U.S. Highway 93 and Nevada State Highway 168 in Clark and Lincoln counties). This development is in its early stages, with no existing residential structures within 1 mile of the proposed ROWs, based on 2008 aerial photography. Pipeline and transmission line ROWs are sited approximately 200 to 300 feet west of the development boundary, parallel to U.S. Highway 93. Highway 93 lies between the proposed project ROWs on the west and the Coyote Springs development boundary on the east. The private land block that includes the Coyote Springs development extends for 9 miles adjacent to Highway 93.
2. Ranch structures at Big Springs (approximately 15 miles south of Garrison, Utah). Ranch buildings and corrals are located near the head of Big Springs, approximately 500 feet east of the proposed Snake Valley lateral pipeline and power line ROWs.
3. Garrison, Utah. This unincorporated community adjacent to Utah Highway 21 includes residences, a church, and other commercial buildings. The nearest Garrison residence is located 1.5 miles east of the pipeline and power line ROW and 1.75 miles from the Snake Valley North Pump Station.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data

4. Baker, Nevada. This unincorporated community adjacent to Nevada Highway 486 and 487 includes residences, an elementary school, and commercial buildings. The nearest Baker residence to the terminus of the Snake Valley pipeline and power line is estimated to be 1.5 miles.

Other potentially noise sensitive areas include federal special management areas.

- The nearest GBNP boundary is located 3.5 miles from the Snake Valley North Pump Station.
- The nearest BLM special management area (Snake Indian Burial Cave) is located 1.6 miles north of the Snake Valley South Pump Station.

Pipeline Safety and Reliability

According to the American Society of Civil Engineers (ASCE), approximately 6 billion gallons of treated water (equivalent to 14 percent of the total U.S. daily water production) is lost nationally due to leaks within water transmission systems. These losses are attributed to the fact that much of the 800,000 miles of water pipelines are constructed with rubber gasket joints. Failure of water transmission mains, however, is a rare occurrence, with an anticipated service life of 65 to 95 years (ASCE 2009). New water transmission pipelines are designed, constructed, and operated to the best industry standards to maximize their efficiency and reliability over their service life.

Design and construction guidelines and standards for water pipelines are published by the American Water Works Association and endorsed by the American National Standards Institute. Additional design guidance is available from ASCE, the National Association of Corrosion Engineers, and to a lesser extent, the Water Environment Federation. Compliance with these standards and guidelines is voluntary, though they may be adopted by regulating agencies. These industry practices are intended to define the level of quality materials that are appropriately used for most water systems, and if followed, will result in a system that is properly designed, tested, and constructed. Design and construction guidelines and standards for water transmission pipelines within the SNWA system are governed by the much more rigorous Facilities Engineering Guides – Volume 3 Pipeline Design. Additional design standards which may be applicable to well-field collection pipes are detailed in the Las Vegas Valley Water District's Uniform Design and Construction Standards: http://www.lvvwd.com/assets/pdf/ eng_udacs_2010.pdf. Those standards were prepared to be in compliance with the State of Nevada's Public Water System Design, Construction, Operation, and Maintenance Regulations (NRS 445A.800 - 445A.955).

3.19.1.3 Groundwater Development Areas

Hazardous Materials and Waste

The results of the database review indicated that there are no known listed sites in the proposed groundwater development areas and pipeline and power line ROWs (NDEP 2009a,b; USEPA 2009b,c).

Regional Ground Water Quality and Contamination

A baseline water quality assessment of the carbonate aquifer in Nevada and Utah was conducted in 2003 by the USGS (Schaefer et al. 2005). Wells completed in the carbonate aquifer were tested for general water quality, isotopes, organic compounds, pesticides, radon, and microbiology. Of 30 wells that were sampled, 7 are located in proposed project basins. Sampling results include the following:

- Inorganic constituents above maximum contaminant levels are probably related to natural conditions in the aquifer rocks and presence of geothermal conditions rather than inputs from human contamination sources.
- Pesticides and pesticide degradation compounds were encountered in agricultural pesticide use areas.
- The detection of VOCs was attributed to contamination of sampling equipment. No analyses were conducted for petroleum hydrocarbons.
- In many of the wells that were sampled, identified aquifer contaminants may not have spread widely because of very slow groundwater flow rates.

Noise

Baseline noise levels within groundwater development areas are comparable to those described for the ROW areas. The community of Baker is located within a portion of a groundwater development area in northern Snake Valley.

Pipeline Safety and System Reliability

Pipeline design and safety standards for gathering pipelines within groundwater development areas are the same as those described for the mainline pipeline.

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3.19.2 Environmental Consequences

3.19.2.1 Rights-of-Way

Issues

The issues and concerns regarding potential impacts of the proposed pipeline and ancillary facility construction and maintenance to public safety and health are listed below:

- Potential effects of hazardous material spills on soils, water, and biological resources.
- Pipeline and ancillary facility construction and operation noise effects on nearby residences and communities.
- Pipeline damage or failure resulting in water loss, resulting in potential risks to public safety, and potential adverse impacts to environmental resources.

Assumptions

- Construction activities include the surface-disturbing activities needed to construct the pipelines, pump stations, meter stations, production well locations, valves, pressure reducing stations, and permanent access roads so that the entire system can be placed into service. It also would include reclamation activities for areas where the surface has been disturbed.
- Operational activities include ROW stabilization measures such as reseeding and repair of erosion control structures. Pumping station noise generation is discussed in this section. Potential water conveyance issues associated with pipeline and pumping station operations are discussed. Evaluation of pipeline water releases are based on the available descriptions of how the SNWA would monitor pressure changes in its pipeline systems to detect leaks and larger accidental releases and the SNWA scenario for a maximum case release.

Methodology for Analysis

The following lists the steps in the analysis of impacts to public safety and health:

- Review the hazardous material and waste handling procedures as described in the Applicant Environmental Protection Measures (**Appendix E**) for conformance to materials management regulations to determine if such procedures would be protective of the environment and public health.
- Evaluate the existing BLM RMP management actions and best management practices and SNWA ACMs (**Appendix E**) to limit the extent and duration of predicted impacts.
- Recommend additional mitigation measures if warranted, to avoid, reduce, or offset impacts.
- Evaluate the effectiveness of the proposed mitigation measures.
- Estimate residual impacts after BLM management actions and BMPs, ACMs, and recommended mitigation measures are applied.
- A qualitative evaluation was completed for the potential environmental effects of a maximum pipeline water release scenario because the pipeline system has been not been fully designed. The maximum release scenario was evaluated in a project location with the greatest elevation change below the release point.

3.19.2.2 Proposed Action, Alternatives A through C

Hazardous Materials and Wastes

The largest quantities of hazardous materials to be used are hydrocarbon fuels (diesel and gasoline) and lubrication oil. It is not possible to predict potential quantities of these materials that would be transported or stored to pipeline segments and construction sites. However, by necessity, much of the fuel and lubricants would be transported directly to work sites on public roads in relatively small tankers (e.g., 3,000 gallons or less for fuel). The ACMs (**Appendix E**) would provide procedures for handling and disposal of hazardous materials and wastes during construction activities (ACM A.1.55). Impacts of hazardous material spills would be direct, but short-term with prompt removal or

remediation of impacted media. Compliance with applicable government regulations and ACMs would substantially reduce spill incidence and the risk of impacts of spills on the environment and public. Adverse events, though uncommon, do occur. With adequate protection measures and swift action to prevent a large loss of material, the risk of long-term effects is reduced. All spills of any size on public lands would be reported to the BLM for implementing response operations.

Ground disturbance during construction activities has the potential for the unintentional discovery of contaminated media, particularly soil. Review of Federal and NDEP databases indicated no known contaminated sites in ROW areas. Therefore, there is low potential for encountering contaminated soil. The project passes through a rural industrial area near the project terminus northeast of Las Vegas. Because of this historic use and because of the potential for unauthorized dumping of hazardous materials, it is recommended that the SNWA conduct soil contaminant surveys within proposed ROWS prior to construction (ROW-PS-1). If contamination is encountered, it would be cleaned up according to applicable rules and regulations.

ROW-PS-1: Hazardous Material Surveys. SNWA would conduct BLM-approved hazardous materials-contaminant surveys before establishing final pipeline ROW locations. Effectiveness: This measure would be effective, minimizing potential impacts from hazardous materials. Pre-construction surveys for hazardous materials would minimize unanticipated disturbance of these areas.

Common hazardous materials used in operations would largely consist of fuels and lubricants, but used in lesser quantities than in construction. However, in contrast to construction, operations at the water storage facility at the pipeline terminus would require the use of water treatment chemicals including sodium chloride, sodium hypochlorite, corrosion inhibitors, and hydrofluorosilicic acid (SNWA 2011). The largest quantity of material would be sodium hypochlorite, with 64,000 gallons expected to be stored on-site at any given time. There also would be 3,200 gallons of zinc orthophosphate (corrosion inhibitor) and 11,200 gallons of hydrofluorosilicic acid available on-site. Other water treatment chemicals could be used depending on the quality of water eventually used and produced.

Sodium hypochlorite is used as a disinfectant for drinking water. It is not persistent in the environment and is broken down readily on exposure to air and water (Agency for Toxic Substances and Disease Registry 2002). It can have acute effects on people since it is very corrosive. Zinc orthophosphate, is lightly toxic, but may have little effect if discharged to the environment (The Cadmus Group 2004). Hydrofluorosilicic acid is a fluoridation agent which is considered a severe irritant for short term human exposure and is toxic to some aquatic animals, but is not persistent in the environment as it is readily neutralized in air and water (CSBP 2008). The level of treatment for arsenic in raw water is not currently known. If arsenic treatment is needed, it would likely involve addition of ferric chloride and sodium hypochlorite. Any sludge generated from arsenic treatment would be deposited in an approved landfill.

Solid waste would consist of trash, empty containers, used oil, and other materials that are designated to be discarded. The ACMs (**Appendix E**) provide procedures for handling and disposal of hazardous materials and solid and hazardous wastes during facility operations, as identified in ACMs A.2.2 and A.2.3.

As with construction activities, impacts of spills would be direct, but short-term with prompt removal or remediation of impacted media. Compliance with applicable government regulations and ACMs would substantially reduce spill incidence and the risk of impacts of spills on the environment and public. Adverse events, though uncommon, do occur. With adequate protection measures and swift action to prevent a large loss of material, the risk of long-term effects is reduced.

Noise

Noise would be generated by construction equipment. The SNWA has committed to maintain standard noise control devices (e.g., mufflers) to reduce construction equipment noise (ACM A.9.1), and to reduce unnecessary engine noise (ACM A.9.3). Noise levels decrease exponentially with distance and therefore, impacts would be limited to areas in proximity to construction. A general estimate of pipeline construction noise ranges from approximately 70 dBA within 500 feet of the construction ROW, diminishing to less than 50 dBA at one mile (California Department of Transportation and USFS 1987). Increased noise from construction equipment would be short-term, intermittently occurring at a given location and lasting only as long as the construction period, potentially 60 to 90 days. Pumping

station noise would be relatively continuous to maintain water flow within the mainline pipeline.It is anticipated the construction equipment would generate noise at levels exceeding 55 DbA at the following noise sensitive locations:

1. The property boundary of the Coyote Springs Development in Clark and Lincoln Counties. Construction noise would be combined with existing traffic noise on Highway 93, which may range from 70 to 80 DbA. It is anticipated that the additive noise levels would increase slightly (2 to 3 dB), and would be more continuous during working hours.
2. The ranch property located at Big Springs in the Snake Valley. This location is rural, and therefore, short-term construction noise levels would increase substantially above current background levels. SNWA has committed to notify the ranch owner in advance of construction and to conduct construction activities during daylight hours to the extent possible (ACM A.9.4).

The SNWA would enclose its pumping stations and utilize design features to minimize operational noise levels (ACM A.9.2). After incorporating these design features, it is anticipated that operational noise levels would not exceed 70 dBA at 500 feet. This level translates to a noise level of less than 50 dBA at one mile from the source (Minnesota Pollution Control Agency 1999).

Pipeline Safety and System Reliability

The only potential for pipeline water releases during construction would occur during hydrostatic testing, when the pipeline would be filled with water and pressure-tested in short sections to ensure the integrity of the pipe during future operations. Water releases from this construction step are expected to be small in volume because of the small fraction of the pipeline length filled at the time of testing and the opportunity to control the rate of release with relief valves. ACM 1.62 states that hydrostatic test water be discharged to dry washes. Erosion control measures would be implemented, and the discharges would be managed and monitored so that they do not exceed the typical 2 to 5 year flood events in these existing washes.

The mainline pipeline system would begin operations as well fields are developed and gathering pipelines are constructed. The system would be operated and monitored as described in Chapter 2, Section 2.5.1.8, Operation and Maintenance. When the potential for a leak or larger release is detected, the system would be shut down to isolate the pipe section where the leak or release is suspected. It is expected that this monitoring and response system will be adequate to detect and control nearly all water releases from the pipelines or ancillary facilities. To insure that SNWA is implementing the best practices to reduce the risk of releases, it is recommended that the SNWA conduct periodic technical reviews of its system (ROW-PS-2).

Proposed Mitigation Measure:

ROW-PS-2: **Five-year Review of Leak Detection Methodologies**. SNWA would review and implement best industry practices for leak detection. Effectiveness: This measure would be effective in reducing pipeline leaks, ruptures, and interruptions in service because it would require the SNWA to evaluate best industry practices regularly and adopt those which are appropriate. Leak detection systems for water pipelines represent a spectrum of evolving technologies. Effect on other resources: There would be no effects of implementing this measure on other environmental resources.

There is low public risk from a sudden pipeline rupture during operations. The potential scenarios that might cause a sudden rupture include:

- Third party (contractor) damage. Pipeline damage can occur when contractors excavate without complying with "One-Call" rules (811).
- Operational error. Transmission pipelines have failed upon sudden closure of valves, without concurrent shutdown of pumps. Notwithstanding the controls that will be designed, installed, and implemented in accordance with the SNWA's Facilities Engineering Guides, human override of controls is always a possibility.
- Earthquakes and fault movement. Faulting, and the attendant risks, are discussed in Section 3.2, Geologic Resources, under Geological Hazards.

- Floods and erosion. The SNWA's Facilities Engineering Guides address the depth of cover necessary to protect the transmission mains against scour. Even if exposed, the joints in SNWA's transmission mains will be fully welded, allowing the pipeline to remain intact. Flood hazard risks are discussed in Section 3.3, Water Resources.
- Terrorist acts, vandalism. Attempts to damage the pipeline system would most likely be directed toward aboveground facilities, which include pumping stations, pressure reducing stations, and the storage reservoir. Access to project aboveground facilities would be controlled by fencing and other surveillance measures. The security needs for the system will depend on the level of threat estimated, which will vary over time.
- The SNWA POD (2011) outlines a maximum water release scenario of 24.6 million gallons from a 10-mile pipeline segment (**Appendix E**). The effects of this scenario would depend upon the water release point. Two possible consequence outcomes are discussed below:
  - Basin side-slope release. This type of release would result in water flowing from a higher elevation on sloping terrain to the next lower basin floor. The greatest elevation difference (approximately 800 vertical feet) from one basin to another is from the Delamar Valley down slope to the Pahranagat and Coyote Springs valleys in Lincoln County. The SNWA pressure reduction facility is proposed at the bottom of this slope in the Coyote Spring Valley to account for this large elevation change. It is likely that released water would flow into the nearest dry wash that would then convey the water stream down the wash channel. Flows of this maximum volume would likely scour and widen the wash channel and convey larger rocks and coarse sediment. Sediment and rocks would likely be deposited on the alluvial fans of the next lower hydrologic basin where slope angles decrease. Finer sediments and gravel would be conveyed out onto the basin floor where the water would spread out and infiltrate into the basin floor. It is possible that water would accumulate in impermeable soil areas (playas) at low points in the basin and would remain until it evaporates. It is likely that perennial vegetation would be removed by scour in dry washes. It is possible that roads and highways that intercept the dry wash would be washed out and require repair. It is not expected that existing residences would be affected by this type of side slope scenario, since no residences are located downslope of drainages traversed by the largest diameter main line pipeline (Spring, Lake, Dry Lake, Delamar, Coyote Springs, and Garnet valleys).
  - Basin floor release. This type of release would likely result in water flowing onto the adjacent basin floor, either via dry washes or sheet flow across low gradient slopes. This type of release would likely cause limited erosion of large rocks and coarse sediment because the elevation change between the release point and the deposition area would be low (likely 50 to 100 vertical feet). It is likely that vegetation would be removed and also covered by deposited sediment. Depending on downgradient conditions, released water would spread out and infiltrate into the basin soil surface or pond in impermeable areas (e.g. playas). The Coyote Spring residential development is located in proximity (within 500 feet) of the large diameter main line pipeline segments in the Coyote Springs Valley. Water from a major release could flow into this residential area (presently unoccupied, but potentially built out in the future). Implementation of water industry design standards and the SNWA Facility Engineering Guidelines would reduce the likelihood of a pipeline failure and large water release. Leak detection systems (based on detecting changes in pipeline pressure) would be implemented during operations. The BLM recommends that the SNWA implement periodic technical reviews of its leak detection system to further reduce the likelihood of water releases (ROW-PS-2).

Conclusion. Fuels and lubricants would be the most common hazardous materials used in construction activities over a pipeline distance of approximately 306 miles. Impacts from spills during construction and operation of ROW facilities would be direct, but short-term, given prompt containment and cleanup of spilled materials. Protective measures proposed by SNWA and the existing regulatory framework greatly reduce the risks of spilled material and associated potential for contamination of soil, water, and biological resources. Hazardous and solid wastes would be handled and disposed off-site according to applicable regulations and applicant protective measures. Although the potential for encountering contaminated media during construction is low, the possibility exists.

It is anticipated that project construction noise would exceed 55 dBA at 2 noise sensitive locations (Coyote Springs Development and ranch at Big Springs) over the short term (60 to 90 days). Implementation of mufflers (ACM A.9.1) would reduce but not eliminate equipment noise.

Compliance with SNWA's Facilities Engineering Guides as indicated above would ensure that SNWA's pipeline is designed, constructed, and operated in accordance with current best practices within the water pipeline industry.

The accidental release of a large pipeline water represents an unlikely event. Nearly the entire pipeline length is located a mile or more from rural residences. The most likely outcome of a large water release event would be erosion in receiving drainages, and water ponding on basin floors. Implementation of leak detection systems, and block valve actuation would limit the size and extent of water releases.

- While highly unlikely, a large accidental water release (up to 24.6 million gallons) could cause dry wash scour and vegetation removal, deposition of rocks and sediment on valley side slopes, and sediment deposition and water ponding on valley floors. It is possible that a large water release could wash out roads and highways; portions of the Coyote Springs residential development (no current residences) located in Coyote Spring Valley could be flooded.

Residual impacts include:

- Compliance with BLM, other federal and state regulations that govern hazardous material cleanup would insure that contaminants in affected soils and water sources would be remediated to agency approved levels.
- No residual noise impacts from construction activities are anticipated.
- Continuous operational noise at the North Snake Valley pump station would be less than 50 A-weighted decibels at 500 feet, a level that is not expected to create activity interference and annoyance in Garrison, Utah. Garrison is located approximately 1.5 miles from the pump station.

3.19.2.3 Alternative D

Conclusion. The management requirements for hazardous materials and solid waste for Alternative D would be the same as for Alternatives A through C. The length of the Alternative D mainline ROW is shorter, 225 miles compared to 306 miles for Alternatives A through C. It is assumed that the risk of hazardous material spills and the amounts of hazardous and solid waste produced would be relatively proportional to the length of the ROW. Therefore, the number of hazardous material spills and waste generated would be about 26 percent less than for Alternatives A through C.

It is anticipated that project construction noise would exceed 55 DbA at one noise sensitive location (Coyote Springs Development) over the short term (60 to 90 days). Implementation of mufflers (ACM A.9.1) would reduce but not eliminate equipment noise.

The risks and magnitude of water releases during hydrostatic testing would be the same as those described for Alternatives A through C.

Residual impacts include:

- Compliance with BLM, other federal and state regulations that govern hazardous material cleanup would insure that contaminants in affected soils and water sources would be remediated to agency approved levels.
- No residual noise impacts from construction activities are anticipated.

3.19.2.4 Alternatives E and F

Conclusion. The management requirements for hazardous materials and solid waste for Alternative E and F would be the same as for Alternatives A through C. The length of the Alternative E mainline ROW is shorter, 263 miles compared to 306 miles for Alternatives A through C. It is assumed that the risk of hazardous material spills and the amounts of hazardous and solid waste produced would be relatively proportional to the length of the ROW. Therefore, the number of hazardous material spills and waste generated would be about 14 percent less than for Alternatives A through C.

It is anticipated that project construction noise would exceed 55 DbA at one noise sensitive location (Coyote Springs Development) over the short term (60 to 90 days). Implementation of mufflers (ACM A.9.1) would reduce but not eliminate equipment noise.

The risks and magnitude of water releases during hydrostatic testing would be the same as those described for Alternatives A through C.

Residual impacts include:

- Compliance with BLM, other federal and state regulations that govern hazardous material cleanup would insure that contaminants in affected soils and water sources would be remediated to agency approved levels.
- No residual noise impacts from construction activities are anticipated.

3.19.2.5 Alignment Options 1 through 4

There would be no important differences in potential impacts to public safety with respect to hazardous materials and solid waste management, pipeline design and construction, and construction noise when comparing Alignment Options 1 through 4 to equivalent segments of the Proposed Action.

3.19.2.6 No Action

Under the No Action Alternative, the proposed project would not be constructed or operated. No project-related surface disturbance or operation activities would occur. Risks to public safety and health would continue in relation to transport and use of hazardous materials for existing activities within the project area.

3.19.2.7 Alternatives Comparison

Table 3.19-1 summarizes the differences in impacts between the Proposed Action and Alternatives A though E.

Table 3.19-1 Summary of Potential Impacts to Public Safety Associated with Right-of-way Development

Potential Impact	Proposed Action and Alternatives A through C	Alternative D	Alternatives E and F
Hazardous Material Spills and Waste	Limited number of hazardous waste spills and waste is properly disposed.	Assume 26% fewer hazardous waste spills and less hazardous waste generated based on shorter mainline pipeline length.	Assume 14% fewer hazardous waste spills and less hazardous waste generated based on shorter mainline pipeline length.
Unantieipated Hazardous Waste Sites	Number of sites limited due to rural project location and prcconstruetion surveys.	Same or less than Alternatives A through C based on shorter mainline pipeline length.	Same or less than Alternatives A through C based on shorter mainline pipeline length.
Noise	Construction noise impaets loealized and limited in duration at two scnsitive noise locations.	Construction noise impaets loealized and limited in duration at onc sensitivc noise location.	Construction noise impaets loealizcd and limited in duration at one sensitive noise location.
Pipcline Safety and System Reliability	Low likclihood of accidental water releases during operations over a pipeline distance of 306 miles. Extent of water releases would be limited by leak deteetion systems and block valves.	Low likelihood of accidental water releascs during operations over a pipeline distance of 225 miles. Extent of water rcleases would be limited by leak deteetion systems and bloek valves.	Low likelihood of accidental water releases during operations over a pipeline distance of 263 miles. Extent of water releases would bc limitcd by leak detection systems and block valves.

3.19.2.8 Groundwater Development and Groundwater Pumping

Issues

The issues and concerns regarding potential impacts of the groundwater development and pipeline water conveyance are the same as those described for the ROWs and ancillary facilities:

- Potential effects of hazardous material spills on soils, water, and biological resources.
- Handling and disposition of solid and hazardous waste.
- Potential effects of water treatment chemical spills on soils, water, and biological resources.
- Pipeline damage or failure resulting in water loss, resulting in potential risks to public safety, and potential adverse impacts to environmental resources.

Assumptions

- Construction activities include the surface-disturbing activities needed to construct the well pads and gathering pipelines. The same BMPs and ACMs discussed for the ROWs (Tier 1) would be applicable to subsequent phases because construction methods would be similar.
- Water quality treatment requirements at well locations cannot be defined until additional water development has occurred. The need for this information for future analysis is included in the list of incomplete and unavailable information in the Chapter 3.0 introduction.
- Evaluation of pipeline water releases are based on the available descriptions of how the SNWA would monitor pressure changes in its pipeline systems to detect leaks and larger accidental releases and the SNWA scenario for a maximum case release.

Methodology for Analysis

- The impact analysis steps for groundwater development in the well fields are the same as those described for the ROW and ancillary facilities (Tier 1).
- A qualitative evaluation was completed for the potential environmental effects of a pipeline water release scenario because the pipeline system has been not been fully designed.
- Mitigation measures discussed in this resource section focus on new measures. Where applicable, some of the ROW mitigation measures may apply to surface disturbance activities associated with groundwater development. These ROW mitigation measures also would be considered in subsequent NEPA tiers.

3.19.2.9 Proposed Action, Alternatives A through C

Hazardous Materials

The types of fuels and lubricants required for collector pipeline construction, and the methods for storage and spill cleanup would be the same as those described for the ROW and ancillary facilities. The types of solid waste, and approved disposal methods would also be the same.

Noise

Groundwater development would include the construction of groundwater development fields and infrastructure to interconnect the well fields to the primary water transmission pipelines. The community of Baker would be located within a groundwater development area in northern Snake Valley. It is recommended that the SNWA apply construction equipment noise reduction measures (ACMs 9.1 and 9.3), and that ACM 9.4 (owner notification and daylight working hours) be applied when construction work is undertaken within 500 feet of an occupied residence.

Safety and Reliability

Future groundwater development would require additional water pipelines. The design, construction, and operation of all future water pipeline and associated facilities would conform to the SNWA's Facilities Engineering Guidelines existing at the time of construction. This conformance would maximize the pipelines' efficiency and ensure reliability

over their service life. The mitigation measures identified for pipelines in the ROW area also would be applicable for all new pipelines of 10-inches or greater diameter.

Conclusion. Public safety concerns for groundwater ROW development would be similar to those described for the main line pipeline and ancillary facilities. The BLM-recommended mitigation measure for pre-construction hazardous material surveys, ROW-PS-1 (Hazardous Material Surveys), would be applicable. With the implementation of the ACMs, impacts from hazardous materials and waste would be short-term and localized.

Noise associated with construction activities would be short-term and localized to areas near the gathering pipeline ROWs and well pads. The vicinity of Baker is included in one of the Snake Valley groundwater development areas. Implementation of noise reduction (ACMs A9.1 and 9.2) and landowner notification and daylight working hours.

Additional water releases are anticipated from operation and maintenance of water wells. While there are numerous well sites (144 to 174 wells for the Proposed Action), releases from individual wells and collector pipelines are expected to be relatively small, posing little risk to public safety or the environment. To insure that the best methods for leak detection and control are used, it is recommended that periodic reviews of leak detection technology, ROW-PS-2 (Five-year Review of Leak Detection Methodology), be implemented.

Potential residual impacts include:

- Residual effects resulting from the use of hazardous materials would depend on the substance, quantity, timing, location, and response involved in the event of an accidental spill or release. In accordance with spill response plans, prompt cleanup of spills and releases would minimize the potential of residual effects due to an accidental spill or release of hazardous materials. Compliance with the BLM, other federal and state regulations that govern the transportation, storage, use, and disposal of hazardous materials and ACMs would greatly reduced the potential for residual effects due to hazardous materials.
- No residual noise impacts to noise sensitive areas are anticipated.
- With the implementation of the water industry and SNWA design measures, the collector water pipelines would be designed, constructed, and operated safely. No residual effects of pipeline water conveyance are expected unless a highly unlikely large water release incident occurred. The potential for a large water release would be less than the mainline because the collector pipeline diameters would be smaller.

3.19.2.10 Alternative D

Conclusion. Potential public safety concerns from groundwater development would be the same as those described for the Proposed Action and Alternatives A through C. The total amount of ROW associated with well fields and collector pipelines is expected to be smaller than the Proposed Action and Alternatives A through C and would be restricted to a smaller area in Lincoln County. The number of unanticipated hazardous waste sites encountered during construction would be equal to or less than the Proposed Action.

Similar to the Proposed Action and Alternatives A through C, noise levels during construction of well pads, access roads, and pipelines within the groundwater development would be localized and of short duration. Since no groundwater development would occur in Snake Valley, no construction noise effects to residences are expected.

Implementation of pipeline design standards and SNWA operational pipeline monitoring systems would reduce the likelihood of a large water release. The potential consequences of a large release are the same as those described for the Proposed Action and Alternatives A through C.

The total amount of ROW associated with well fields and collector pipelines associated with Alternative D is expected to be smaller than the Proposed Action and Alternatives A through C. While water releases from wells and collector pipelines are possible during the project's life, most are likely to be small, posing little risk to the environment or public safety.

Potential residual impacts include:

- Residual impacts would be the same as Alternative A through C except that the use of hazardous materials and risk of encountering existing contamination would be less because of fewer miles of pipeline. The potential for a large water release would be less than the mainline pipeline because the collector pipeline diameters would be smaller.

3.19.2.11 Alternatives E and F

Groundwater Development

Conclusion. Potential public safety concerns from groundwater development would be the same as those described for the Proposed Action and Alternatives A through C. The total amount of ROW associated with well fields and collector pipelines is expected to be smaller than the Proposed Action and Alternatives A through C because there would be no facilities in Snake Valley. The number of unanticipated hazardous waste sites encountered during construction would be equal to or less than the Proposed Action.

Similar to the Proposed Action and Alternatives A through C, noise levels during construction of well pads, access roads, and pipelines within the groundwater development would be localized and of short duration. Since no groundwater development would occur in Snake Valley, no construction noise effects to residences are expected.

Implementation of pipeline design standards and SNWA operational pipeline monitoring systems would reduce the likelihood of a large water release. The potential consequences of a large release are the same as those described for the Proposed Action and Alternatives A through C.

The total amount of ROW associated with well fields and collector pipelines associated with Alternatives E and F is expected to be smaller than the Proposed Action and Alternatives A through C. While water releases from wells and collector pipelines are possible during the project's life, most are likely to be small, posing little risk to the environment or public safety.

Potential residual impacts include:

- Residual impacts would be the same as Alternatives A through C except that the use of hazardous materials risk of encountering existing contamination would be less because of fewer miles of pipeline. The potential for a large water release would be less than the mainline pipeline because the collector pipeline diameters would be smaller.

3.19.2.12 No Action

Under the No Action Alternative, the proposed project would not be constructed or operated. No project-related surface disturbance or operation activities would occur. Risks to public safety and health would continue in relation to transport and use of hazardous materials for existing activities within the project area.

3.19.3 Cumulative Impacts

Because health and safety issues are site-specific to the SNWA pipeline and water development, none of the identified past, present, and reasonably foreseeable projects identified in Chapter 2 are anticipated to interact with this project to create expanded cumulative impacts. The public transportation system (highways, roads) would be utilized by SNWA for delivery of treatment chemicals at the water storage and treatment facility northeast of Las Vegas. The small volume of SNWA-related truck traffic (less than 10 deliveries per month to the site) did not warrant further analysis.

3.19.3.1 Impacts Common to All Alternatives

Climate Change Effects

Climate change already appears to be influencing both natural and managed ecosystems of the American Southwest (Breshears et al. 2005, Westerling et al. 2006, Seager et al. 2007) and models indicate the likelihood of the Southwest being a climate change "hotspot" in the coming decades (Diffenbaugh et al. 2008). Recent warming in the Southwest is among the most rapid in the nation, significantly more than the global average in some areas (USGCRP 2009). Projections suggest continued strong warming in the region, with significant increases in temperature (USGCRP 2009) and decreases in precipitation (Seager et al. 2007). A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (USGCRP 2009). Greater variability in patterns of precipitation can be anticipated in the future. In the coming century, mean global temperature could increase significantly, with an associated increase in both the frequency of extreme events (heat waves, droughts, storms) and the frequency and extent of wildfire (IPCC 2007; Westerling & Bryant 2008; Krawchuk et al. 2009). Under such conditions, future impacts could be substantial for some resources, impacting biodiversity, protected areas, and agricultural lands.

Climate Change Effects to Public Safety and Health

Climate change effects were not evaluated for this resource because potential effects to Public Safety and Health as a result of climate change cannot be directly quantified.

3.20 Monitoring and Mitigation Summary

This section describes the monitoring and mitigation measures developed through the NEPA process and how they would be implemented with other protection measures that are described in this document. This section also describes the process and components to be used in developing an integrated and comprehensive COM (construction, operation, maintenance, monitoring, mitigation, and management) Plan. This plan would encompass all proposed surface disturbance activities and facilities for this Tier 1 NEPA action and would set the stage for monitoring, management, and mitigation for future development addressed by subsequent NEPA tiers. The objectives of the COM Plan are to protect federal resources and federal water rights that may be impacted by construction, operation, maintenance, and abandonment of the GWD Project-related facilities.

CEQ issued a Memorandum on January 14, 2011 titled – Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact. The CEQ guidance is intended to assist agencies with the development and review of their NEPA procedures. The guidance addresses mitigation that an agency has committed to implement as part of project design and mitigation commitments informed by the NEPA review process by specifically recommending:

- How to ensure that mitigation commitments are implemented;
- How to monitor the effectiveness of mitigation commitments;
- How to remedy failed mitigation; and
- How to involve the public in mitigation planning.

The BLM COM Plan contained in this section is consistent with the CEQ Memorandum and the DOI and BLM policy and procedures related to identifying and implementing project mitigation and monitoring.

3.20.1 Resource Protection Measure Sources

The protection measure framework and sources of resource protection are discussed below and shown in **Figure 3.20-1**.

NEPA Monitoring and Mitigation Measures – Based on the resource-specific impact analyses provided in Chapter 3, this section summarizes the GWD Project monitoring and mitigation measures developed through the NEPA process. **Table 3.20-1** provides resource-specific monitoring and mitigation measures. Main conveyance pipeline measures are related to the Tier 1 NEPA impact analyses and are tied to decisions that will be made by the BLM in the ROD. These measures are identified with a "ROW" prefix. They also may be applied to future groundwater development facilities (e.g., impacts related to placement of future wells, collection pipelines, power lines, and access roads).

Impacts involving future groundwater development and pumping were analyzed at a programmatic level (subsequent NEPA tiers). Measures identified with a "GW" would be applied where appropriate to actions associated with this EIS or to subsequent NEPA analyses (i.e., mitigation and monitoring may be adjusted or supplemented as appropriate in subsequent NEPA tiers). In particular, these monitoring and mitigation measures are based on currently available information that would be applied to the future activities. These measures are necessarily general in nature, since they are based on the programmatic NEPA analysis for the groundwater development and related facilities. However, until they are replaced by more specific measures that would result from future NEPA analyses, these measures would apply to these future activities.

Table 3.20-1 also identifies mitigation measures that would be recommended for consideration by other agencies, but are not within the jurisdiction of the BLM.

BLM Resource Management Plans – All actions approved or authorized by the BLM must conform to the existing land use plans (43 CFR 1610.5-3, 43 CFR 2920.2-5). The BLM Ely District RMP (BLM 2008) and the BLM Las Vegas District RMP (BLM 1998) provide management direction for all BLM-managed lands that would be occupied by the GWD Project facilities.

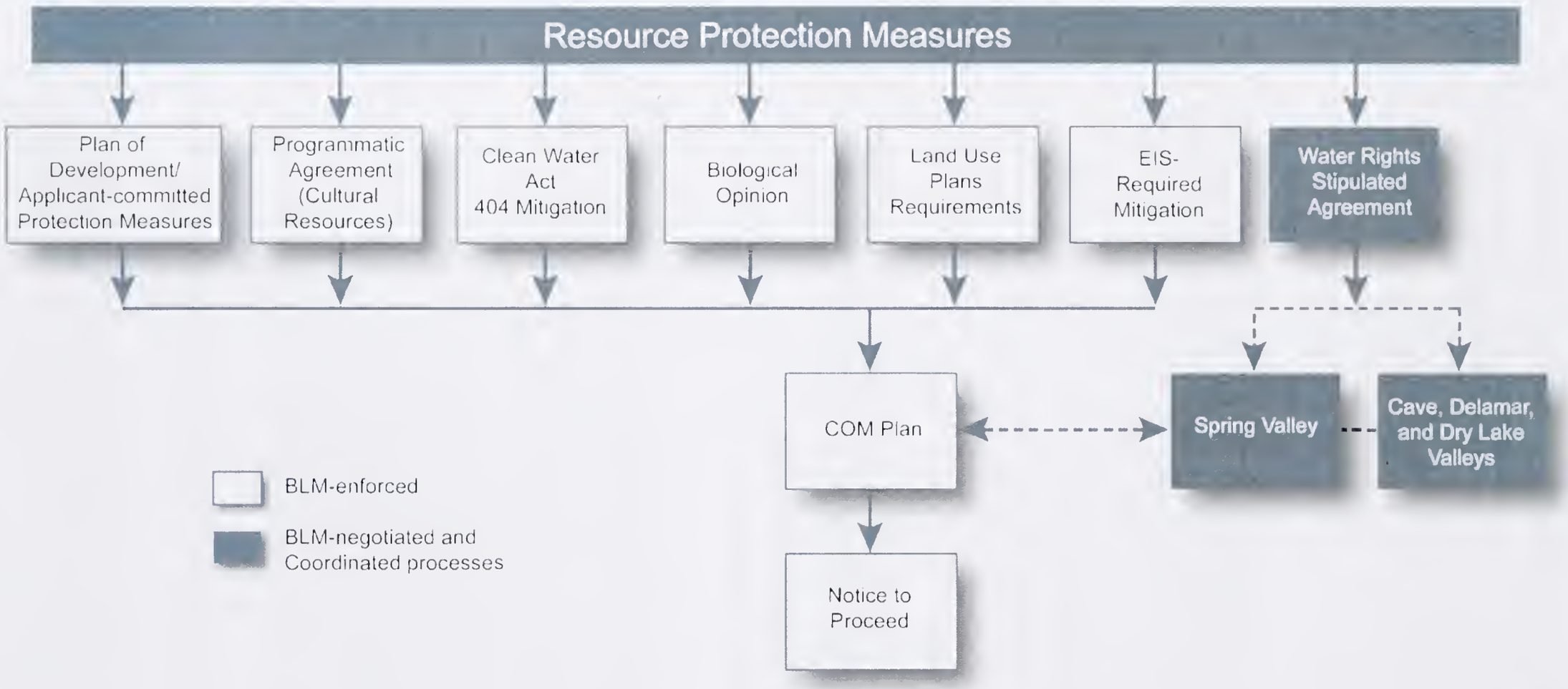

Figure 3.20-1 Protective Measure Framework

BLM Best Management Practices – The BLM Ely District RMP identifies BMPs and USFWS BO terms and conditions prepared for the RMP in 2008 that would apply to all land use decisions including the GWD Project. The Ely BMP measures also would be applied in land use authorizations related to this GWD Project in the BLM Southern Nevada District. **Appendix D** of this Final EIS contains the BLM BMPs and USFWS RMP BO terms and conditions that apply to the GWD Project.

Biological Opinion – The USFWS will issue a BO for the ROW that will include terms and conditions to maintain and protect threatened and endangered species as required under section 7 of the ESA. Also included will be a programmatic BO with conservation measures and/or terms and conditions related to future development associated with this project. The BO will be an attachment to the ROD. If section 7 consultation is reinitiated during the life of the project, new terms and conditions, and/or conservation measures would be incorporated into the COM Plan. New terms and conditions and/or conservation measures also would be incorporated into the COM Plan, based on section 7 consultation for future site-specific components of the GWD Project.

Applicant-committed Protection Measures – The proponent, SNWA, has committed to ACMs that would be implemented as part of the construction and operation of the GWD Project. ACMs include design features, monitoring, standard operating procedures, and other resource protection practices. They also include measures SNWA has previously agreed to in stipulations or other agreements with federal, state, or local agencies and entities, as well as those required by the NSE water right permit conditions. As part of the ACMs, SNWA has committed to implementing an adaptive management approach, as described in **Appendix E** of the Final EIS.

Section 106 Programmatic Agreement – A PA was completed under the provisions of section 106 of the NHPA. The agreement was executed by the BLM, the ACHP, the SHPO, and the SNWA. The PA describes procedures for mitigating impacts to cultural resources (**Appendix F3.16**).

Stipulated Agreements (Stipulations) – SNWA has entered into several stipulations with DOI Bureaus (i.e., BIA, BLM, USFWS, and NPS). The agreements apply to the SNWA's water rights in Spring, Cave, Dry Lake, and Delamar valleys. The stipulated agreements are intended to manage the development of groundwater by the SNWA in various hydrologic basins without causing injury to federal water rights or unreasonable adverse effects to federal resources and special status species. These agreements are provided in **Appendix C** of the Final EIS.

In general, the stipulations require the following: systems of monitoring wells in both carbonate and valley fill aquifers; constant-rate aquifer tests; groundwater chemistry sampling; spring and stream discharge measurements; and annual monitoring reports. Both the Spring Valley and the Delamar, Dry Lake, and Cave valleys stipulated agreements require a biological resource monitoring program. The stipulations recommend that teams be established to guide the implementation of monitoring activities. These teams have been developed and monitoring activities have begun.

The stipulated agreement process would contribute to the COM Plan by providing direction on a variety of monitoring, management, and mitigation processes. The BLM does not have authority to enforce the stipulated agreement process; however, the BLM can influence the monitoring, management, and mitigation measures implemented pursuant to the stipulations. Also, as a signatory to the agreements, the BLM has access to all of the information and decisions developed under the stipulations.

Snake Valley – There is currently no stipulated agreement for Snake Valley because the NSE has not scheduled water rights hearings on SNWA's applications within Snake Valley. To ensure compliance with the FLPMA, NEPA, LCCRDA, and conformance with the COM Plan, the BLM would require that a 3M Plan be developed for Snake Valley in the future, if project impacts determine the need for the plan or SNWA proposes development in Snake Valley. The Snake Valley 3M Plan would be in accordance with the framework specified in **Appendix B** of the Final EIS.

In addition it should be noted that before groundwater can be exported out of this shared basin, the LCCRDA requires Nevada and Utah to reach an agreement on the allocation of water in the flow system. BLM anticipates that the bi-state agreement would include monitoring, mitigation, and management requirements. When that agreement is reached, appropriate requirements would be incorporated into the COM Plan.

Clean Water Act Section 404 Mitigation – The USACE has jurisdiction related to this project under the authority of section 404 of the Clean Water Act for the discharge of dredged or fill material into waters of the U.S. Project features that result in the discharge of dredged or fill material into waters of the U.S. would require prior USACE authorization. The USACE may require mitigation measures to ensure section 404 compliance. Those measures would be included in the COM Plan.

3.20.2 Summary of Monitoring and Mitigation Measures:

These monitoring and mitigation measures (**Table 3.20-1**) were developed for the Final EIS and are available for inclusion into the ROD, if deemed appropriate by the authorized officer.

Table 3.20-1 Summary of Monitoring and Mitigation Measures

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Air and Atmospheric Values		
ROW-AQ-1: Project Road Inspections to Reduce Wind and Water Erosion. The SNWA and the BLM's Environmental Compliance Monitor would inspect project roads in areas prone to air and water erosion bi-weekly during construction, or more frequently during periods of adverse weather conditions. Repairs would be completed within 5 working days of notification to the SNWA or sooner depending on public safety and the nature of the issue detected. SNWA would make a photographic documentation of the road condition prior to and immediately after road repairs.	✓	
ROW-AQ-2: **Alternative Dust Control Measures**. Areas where soil tackifiers are prohibited (e.g., threatened and endangered species habitat, perennial stream drainages) would be determined in cooperation with the BLM and the USFWS prior to construction, and identified in both the Construction and Mitigation Plans. Other mitigation (e.g., gravel application) may be required to reduce impacts and to ensure protection of public safety. This measure would supplement SNWA ACM A.10.3.	✓	
GW-AQ-3: Monitoring, Mitigation, and Management Plan for Air Quality. SNWA would develop an air monitoring plan approved by the BLM, which would detail the siting and operation of at least three collocated PM_{10} and $PM_{2.5}$ air monitoring stations, one of which would be upwind of the project area. Recommended monitoring locations include Snake, Spring, and Lake valleys. These valleys are selected for consideration based on predicted changes to the bare soil/sparse vegetation ET unit, which has the greatest potential for windblown dust impacts. Baseline air measurements would be initiated at least a year prior to groundwater pumping construction activities, since these activities may increase measured particulate values. Once baseline air quality levels are established, monitoring would continue for the duration of groundwater pumping activities. Finally, the monitoring plan would comply with USEPA monitoring guidance when selecting the site locations and instruments, developing the data management plan, and establishing quality assurance criteria.	✓	
Geologic Resources		
GW-G-1: Cave Protection. Prior to ground disturbing or drilling activities in areas close to identified cave resources, the conditions of approval would require appropriate site specific measures for the protection of caves that may be at risk such as, but not limited to, the following: • Reasonable and appropriate setbacks and buffers around caves. • Limitations on blasting. • Requirements for the storage and handling of hazardous materials such as fuels. Other measures that may be appropriate for wells including procedures when encountering subsurface voids while drilling, closed drilling fluid (mud) systems (no earthen mud pits), use of freshwater mud, directional drilling, and special casing programs.	✓	
GW-G-2: Underground Voids. If underground voids are unexpectedly encountered during facility construction or drilling, the following measures would apply: • Work would be halted and the BLM would be notified immediately. • The BLM, in consultation with the permittee, would assess the risk of further drilling or siting of surface facilities in the area where the voids are encountered. • Risk assessment may require the use of appropriate geotechnical methods to gather relevant data on the extent of karst features.	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Geologic Resources		
GW-G-3: Subsidence Monitoring. Subsidence monitoring is recommended in current and proposed water withdrawal areas in order to provide baseline data before build out begins. As groundwater extraction occurs in full production, monitoring would be needed to assess the magnitude and extent of subsidence in order to take actions that would mitigate subsidence where necessary.	✓	
Water Resources		
ROW-WR-1: Stream Crossing Construction Plan. A site-specific plan would be developed to detail the construction procedures, erosion control measures, and reclamation that would occur for pipeline construction across live (flowing) stream reaches. The plan would include site-specific designs using either open cut or jack and bore techniques and site-specific measures to minimize disturbance of the stream bed, and release of sediment from the construction area into the downstream stream reach. The plan would be reviewed and approved by the BLM and NDOW prior to initiation of any construction activities within the stream corridor.	✓	
ROW-WR-2: Avoid Power Line Structures in Streams. Power line structures would be designed to span all perennial streams and other ephemeral/intermittent streams or washes. No power line structures or ancillary facilities would be located within the active channels of these streams. Access roads constructed for the power line would be located to avoid or minimize disturbance to perennial and intermittent streams.	✓	
ROW-WR-3: Construction Water Supply Plan. A Construction Water Supply Plan would be provided to the BLM for approval prior to construction. The plan would identify the specific locations of water supply wells that would be used to supply water for construction of the water pipeline and ancillary facilities; identify specific groundwater aquifers that would be used; estimate effects to surface water and groundwater resources resulting from the groundwater withdrawal; define the methods of transport and delivery of the water to the construction areas; and identify reasonable measures to reuse or conserve water. The BLM would review and approve the plan and, if necessary, include any monitoring or mitigation requirements required to minimize impacts prior to construction approval. SNWA would provide the drilling logs and water chemistry reports on water wells drilled for pipeline construction. BLM in consultation with State agencies and grazing permittee will review the location of construction water wells and determine if any would be needed for multiple use management goals. If specific wells slated to be plugged and abandoned are determined to be a benefit to the BLM for multiple use management, the BLM would work with the SNWA to procure the rights to the wells and obtain appropriate water rights for the beneficial use(s).	✓	
GW-WR-1: Spring Inventories. A spring inventory would be conducted in all groundwater development areas to verify and map the location of all springs prior to construction. Construction and development of the groundwater development areas would avoid ground disturbance in the vicinity (i.e., 0.5 mile) of all verified spring locations.	✓	
GW-WR-2: Stream Crossing Plans. A site-specific plan would be developed to detail the construction procedures, erosion control measures, and reclamation that would occur for pipeline construction across live (flowing) stream reaches. The plan also would incorporate information from BLM Technical Reference 423, for hydraulic considerations in designing pipeline stream crossings (DOI 2007). The plan would include site-specific designs using either open cut or jack and bore techniques and site-specific measures to minimize disturbance of the stream bed, and release of sediment from the construction area into the downstream stream reach. The plan would be reviewed and approved by the BLM and NDOW prior to initiation of any construction activities within the stream corridor.	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Water Resources		
GW-WR-3a: Comprehensive Water Resources Monitoring Plan. Prior to any project pumping in Spring, Delamar, Dry Lake, or Cave valleys, the SNWA would develop a comprehensive water resources monitoring plan (WRMP). This plan would specify hydrologic monitoring requirements (i.e., meteorological and surface water and groundwater) to provide adequate baseline data to facilitate the creation of an early warning system designed to distinguish between the effects of project pumping, natural variations, and other non-project related groundwater pumping activities. The WRMP also would identify monitoring requirements to be used to improve the calibration and predictive abilities of the numerical groundwater flow models (GW-WR-3b) used to estimate future effects associated with the groundwater development project. The WRMP would specify the siting, installation, monitoring frequency, and monitoring and testing methodology (including quality control and quality assurance procedures). The WRMP would be implemented such that critical baseline data necessary to determine pumping effects would be collected for a period of at least 5 years prior to the initiation of pumping. The WRMP would be developed, implemented, and maintained by the SNWA with approval by the BLM in coordination with other federal and state agencies (as deemed appropriate by the BLM). The WRMP design would allow for reasonable modifications and adjustments to monitoring locations over the project life to account for the results of the monitoring, updated groundwater flow model predictions, and updated biological surveys and habitat/species monitoring. The WRMP would include surface water and groundwater monitoring sites that have been identified as critical to providing an early warning system for potential effects to federal resources and federal water rights identified by the BLM. The monitoring would include water sources essential for threatened or endangered species, and other BLM-identified sensitive species and related habitat determined to be at risk from the project pumping or ground disturbance related activities. A list of springs and streams with sensitive species or game fish on public lands determined to be at risk from the project (where monitoring is likely to be required) under the various alternatives is provided in **Table 3.3.2-9**. Monitoring at specific surface water sites could include surface water flow monitoring and/or monitoring wells located near the surface water source designed to monitor changes in groundwater elevation.	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Water Resources		
GW-WR-3a: Comprehensive Water Resources Monitoring Plan (Continued). *Groundwater Elevation Monitoring Sites* The WRMP also would include a monitoring well network designed to track the magnitude and aerial extent of drawdown overtime resulting from the project pumping activities. It is anticipated that this monitoring well network would include monitoring wells located in the following areas. • Wells sited in each pumping basin designed to monitor the magnitude and extent of the drawdown over time from project pumping. This would include wells designed to monitor the basin fill aquifer and carbonate aquifer systems; and in some areas, volcanic aquifers. • Wells sited to monitor groundwater elevations (including wells both in the carbonate aquifer and basin fill aquifers) in the area between southern Spring Valley and southern Snake Valley and northern Hamlin Valleys. • Wells sited in southern Snake Valley to monitor drawdown effects in southern Snake Valley due to pumping in Spring or Snake valleys. • Wells sited to monitor for propagation of drawdown from project pumping in Spring or Snake valleys to major spring discharge areas in northern Snake Valley (e.g., Gandy Salt Marsh Complex, Bishop Spring Complex, Leland-Harris Spring Complex, and Twin Springs). • Well(s) sited along the eastern margin of Steptoe Valley to monitor for the westward propagation of drawdown from project pumping in Spring Valley into Steptoe Valley beneath the Schell Creek Range. • Well(s) sited in northeastern Lake Valley to monitor for the propagation of drawdown from project pumping in Spring Valley to the area of Geyser and Wambolt springs in Lake Valley. • Well(s) sited on the west side of Lake Valley to monitor for the propagation of drawdown from project pumping in Cave Valley to the area of Geyser and Wambolt springs. • Wells sited in Cave Valley and at the base of Shingle Pass in southern White River to monitor and track the westward propagation of drawdown from project pumping in Cave Valley towards the springs that discharge along the southeastern margin of White River Valley (i.e., Flag and Butterfield springs). • Wells sited on the northern boundary between Delamar and Pahranagat valleys, and in northern Pahranagat Valley to monitor groundwater elevations between the project pumping in Dry Lake and Delamar valleys and the regional spring discharge in northern Pahranagat Valley (i.e., Hiko, Crystal and Ash springs). • Well(s) sited in the Pahranagat Shear Zone at the boundary between southern Delamar and southern Pahranagat valleys to monitor groundwater elevations between the groundwater production well field in Delamar Valley and the perennial water resources in southern Pahranagat Valley (i.e., Pahranagat National Wildlife Refuge). The WRMP would include other springs and streams sites, and groundwater monitoring areas as deemed appropriate by the BLM. In additional to the sites listed previously, monitoring sites would be included as necessary to: a) track the extent and magnitude of the drawdown; b) monitor flows in perennial springs and streams determined to be at risk of effects from the groundwater development; and c) provide early warning monitoring of groundwater levels between the production well fields and federal water rights and other water dependant resources identified as critical for management and protection of the BLM's water dependant resources.		

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Water Resources		
GW-WR-3a: Comprehensive Water Resources Monitoring Plan (Continued). *Monitoring Results Reporting Requirements* The BLM-approved WRMP would specify the reporting requirements for the monitoring plan. At a minimum, the WRMP would require that SNWA provide the BLM with the following information upon implementation of the WRMP and over the life of the groundwater development project: 1. Quarterly reporting of the results of any meteorological, surface water, and groundwater monitoring required for the project (including all field and laboratory data and analysis). 2. An Annual Report that summarizes and evaluates all monitoring results. The report would minimally include: a. Drawdown maps identifying the change in groundwater levels from the previous year, and total drawdown since groundwater pumping was initiated; b. Hydrographs for groundwater monitoring wells indicating the change in groundwater levels since monitoring was initiated at each site; c. Hydrographys for surface water flow monitoring sites indicating changes in flow since monitoring was initiated at each site; d. Water quality sampling and testing results for each monitoring site (where water quality monitoring is required); e. Description of identified reductions in flow in any monitored surface water resources in the region; f. Evaluation of the likely causes for reductions in surface water flow identified in (e); g. Description of any significant changes in water quality identified in surface water or groundwater monitoring locations; h. Description of any deviations of the monitoring results from the current groundwater flow model predictions or anticipated from prior monitoring; and i. Proposed modifications to the monitoring plans based on the results of the monitoring or updated groundwater flow model predictions (i.e., changes to the monitoring well network, or network of springs and stream sites). 3. All data collected as part of the WRMP and quarterly and annual reports, would be accessible to the public and other federal and state agencies via an internet site. The design and maintenance of the internet site would be the responsibility of SNWA and would be approved by the BLM.		
GW-WR-3b: Numerical Groundwater Flow Modeling Requirements. The regional model would be updated and recalibrated at least every 5 years (after pumping is initiated) or sooner if BLM identifies major differences between the model simulations and monitoring results (GW-WR-3a) and determines that model recalibration is necessary. In addition to the regional groundwater flow model, the SNWA would develop more detailed (local scale) groundwater flow models designed to simulate the effects of pumping within each specific basin. These basin-specific models would be developed and approved by the BLM prior to BLM's NEPA review of specific groundwater development activities proposed by the SNWA. The basin-specific models would be coupled with the regional model by constructing separate models, whose boundary conditions are linked to the regional model; constructing an "embedded" model where the local model is coupled to the regional model; or using another method approved by the BLM. The BLM would utilize the basin-specific models and the regional groundwater model to conduct a more detailed NEPA evaluation of potential project-related pumping impacts once the location and pumping schedules for the production wells have been defined by SNWA. Additionally, the BLM would use the basin-specific models to critically evaluate the effectiveness of the proposed mitigation measures, ACMs, and other proposed adaptive management processes. The basin-specific models also would be recalibrated at least every 5 years (after pumping is initiated) or sooner if the BLM identifies major differences between the model simulations and monitoring results and determines that model recalibration is necessary. The regional groundwater flow model and basin-specific models would be maintained through the life of the project. The BLM would establish a Technical Review Team to review the model on a periodic basis to provide recommendations to improve the calibration and predictive ability of the numerical groundwater flow model(s). The BLM, with input from their Technical Review Team, would determine if periodic updates of the groundwater flow model are no longer necessary or if other groundwater flow models or predictive tools should be used.del are no longer necessary or if other groundwater flow models or predictive tools should be used.	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Water Resources		
GW-WR-4: Monitoring, Mitigation, and Management Plan for Snake Valley. Mitigation measure GW-WR-4 described below includes the water resource components of the draft documents prepared by BLM during preparation of the Draft EIS: 1) Monitoring, Mitigation, and Management Plan for Snake Valley, Utah-Nevada; and 2) Guidance to Technical Working Group for Development of Snake Valley Monitoring, Mitigation and Management Plan. The complete Monitoring, Mitigation, and Management (3M Plan) documents are provided in **Appendix B**.	✓	
GW-WR-5: Shoshone Ponds. Drawdown is likely to impact the source of water that supports important aquatic resources for Shoshone Ponds (as discussed in Section 3.7, Aquatic Biological Resources). The SNWA would develop a surface water and groundwater monitoring plan specific to providing an early warning system for effects to flow at Shoshone Ponds. The site specific monitoring plan would likely include monitoring discharge at the Shoshone ponds; and monitoring artesian pressures in the aquifer that controls discharge to the ponds. The general requirements for development, approval, implementation, and reporting for the Shoshone ponds monitoring plan would be the same as outlined in GW-WR-3a. Impacts to Shoshone Ponds that are attributable to the SNWA's groundwater pumping would be mitigated by improving the existing well or drilling a new well, and installing a pump such that the well, pump, and water conveyance system are designed to maintain the flow to the ponds for the foreseeable future regardless of the groundwater drawdown. Any new well should be designed to pump groundwater from the same aquifer system to maintain the same general water quality and temperature characteristics currently used as the source of water for the ponds and sufficient to support the federally listed and special status species that inhabit the ponds, as described in Section 3.7, Aquatic Biological Resources. The SNWA would be responsible for all cost associated with the implementation, operation, and maintenance of the source of water required to offset the effects of SNWA's groundwater pumping activities.	✓	
GW-WR-6: Existing Water Rights, Domestic Water Supply Wells and Other Water-Dependent Resources. Impacts to existing water rights and domestic water supply wells would be mitigated, as required by the State of Nevada or Utah (presumably acting under authority of an interstate agreement between Utah and Nevada that would be developed prior to future development). The NSE would oversee the groundwater development and is required by law to take action to resolve groundwater withdrawal conflicts with existing water rights; to protect the water supply used by domestic water supply wells, or to determine the resolution of conflicts with other provisions of Nevada water law. The NSE also "*recognizes that existing rights must be protected, as well as concerns for the wildlife and maintenance of wetlands and fisheries*" (NDWR 2012a,b,c,d). Mitigation for impacts to existing water rights and domestic water supply wells, as well as water dependent resources, would depend on the site-specific conditions and impacts and could include a variety of measures. Methods to avoid or minimize impacts to existing water rights, water dependent resources and domestic water supply wells, may include such measures as alterations to the groundwater pumping activities (e.g., modifying the pumping regime, changing the location of pumping). The NSE could require the implementation of other proven and cost-effective mitigation measures at the water source locations. These measures may include but would not be limited to the following: 1) for wells, mitigation could include lowering the pump, deepening an existing well, drilling a new well, or providing a replacement water supply of equivalent yield and water quality; and 2) for surface water rights and water dependent resources, mitigation could require providing a replacement water supply of equivalent yield and water quality.		✓

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Water Resources		
GW-WR-7: Groundwater Development & Drawdown Effects to Federal Resources and Federal Water Rights. If the results of the monitoring or modeling information provided in accordance with GW-WR-3a indicate that impacts to federal resources or federal water rights from groundwater withdrawal are occurring or are likely to occur, and the groundwater development project is the likely cause of or contributor to the impacts, the following measures would be initiated: 1. The BLM would evaluate the available information and determine if emergency action and/or a mitigation plan is required. 2. If the BLM determines that emergency action is required to avoid, minimize, or offset the impact, the BLM would serve an immediate "Cease and Desist" order identifying the actions to be taken, including whether SNWA would be required to concurrently develop a mitigation plan as required in bullet 3 below. 3. If the BLM determines that a mitigation plan is required, the SNWA would prepare a detailed, site- specific plan that (a) identifies the magnitude and timing of the drawdown or associated impacts to federal resources or federal water rights; and (b) provides detailed site-specific measures that would be used to avoid, minimize the magnitude of, or offset the identified impacts. The mitigation plan would be submitted to BLM for approval within 30 days of BLM's determination that a site-specific mitigation plan is required (unless a longer timeframe is approved by BLM). 4. The BLM-approved, site-specific mitigation plan would be implemented by the SNWA. The BLM could require that specific measures be implemented per the schedule specified in the mitigation plan to avoid, minimize, or offset the impacts to federal resources or federal water rights. The specific mitigation measures may include but are not limited to the following: – Reduction or cessation in groundwater withdrawals; – Geographic redistribution of groundwater withdrawals; – Recharge projects to offset local groundwater drawdown; – Flow augmentation to maintain flow in specific water sources; or – Other on-site or off-site improvements. Monitoring of the surface water resources and groundwater elevations required under Mitigation Measure GW-WR3a would be used in addition to other specified monitoring in the approved mitigation plan to document the effectiveness of the implemented measures. If the initial implementation of the mitigation plan does not provide the desired results within the time frame specified by the BLM, the BLM may require implementation of additional measures.	✓	
Vegetation Resources		
ROW-VEG-1: Native Seed Collection. The SNWA, in consultation with the BLM, would develop a seed collection program for native plant species found within the ROW. These native plant seeds would be used along the ROW corridor in revegetation and reclamation activities, to the extent feasible, to enhance the rate and quality of recovery. Seed from locally adapted native sources would likely provide the greatest rates of establishment and subsequent growth, increasing the success of reclamation efforts. Target species and collection methods would be identified in the Restoration Plan.	✓	
ROW-VEG-2: Temporary Fencing or Closure to Livestock Grazing. The SNWA would conduct pre-construction surveys to determine areas of livestock use within and adjacent to the construction ROW where application of temporary fencing or closure would be needed for revegetation species establishment. The results of these surveys would be provided to the BLM for review and approval. Revegetation areas would be rested from grazing for two full years or until BLM determines that reclamation meets BLM RMP standards.	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Vegetation Resources		
ROW-VEG-3: Green Stripping. SNWA, in consultation with the BLM, would develop a green stripping revegetation prescription where BLM and SNWA preventive and control measures may be inadequate to mitigate risks of weed invasion and wildfire. Green stripping is defined as ROW revegetation with fast-growing herbaceous species that can outcompete annual and perennial weeds and can provide a green firebreak. Locations where this measure may be applied would be identified in the Restoration Plan, Integrated Weed Management Plan, and Fire Prevention Plan, and approved by the BLM Visual Resource Management Coordinator. For example, it would be applied primarily to Great Basin Desert low elevation bottomlands, with limited applications to open evergreen woodlands (due to low risk for weed invasion) and Mojave Desert lowlands (due to low risk as a fire disturbance ecosystem).	✓	
ROW-VEG-4: Special Status Plant Species Establishment. In addition to salvaging and transplanting special status species found in the ROW for tier 1 or subsequent tier construction activities, the SNWA would grow additional plants from seed (collected from individuals prior to salvage) or by grafting (from the salvaged plants) to enhance the new, transplanted populations. Seed collection for this effort would occur over multiple years prior to plant salvage. Specific special status plant species and collection methods would be identified in the Restoration Plan.	✓	
ROW-VEG-5: Blaine's Fishhook Cactus Surveys. The SNWA would begin Blaine's fishhook cactus (*Sclerocactus blainei*) surveys as soon as possible after project design and engineering is complete; conducting the surveys within known and potential habitat during the next appropriate season for plant identification. The goal of this mitigation measure is to allow for a minimum of two to three years of surveys, since this species may stay underground for several years. A 3-meter exclusion area would be established around any individuals found during the surveys.	✓	
ROW-VEG-6: Blaine's Fishhook Cactus Transplantation. If found during surveys, Blaine's fishhook cactus (*Sclerocactus blainei*) individuals would be transplanted to undisturbed BLM land that is as similar as possible to the habitat from which it was removed. Site selection requirements and details would be provided in the Restoration Plan.	✓	
ROW-VEG-7: Blaine's Fishhook Cactus Compensation. If enhancement measures fail to restore Blaine's fishhook cactus (*Sclerocactus blainei*) where it is found in the ROW prior to construction, SNWA would establish a compensatory mitigation fund for direct, indirect, and cumulative impacts to the species. A single payment of $10,000 would be made by the project applicant (SNWA) to the Center of Plant Conservation. This funding would specifically be used for preserving the genetic material of this species in perpetuity. Details regarding the definition of success with regard to *Sclerocactus blainei* would be determined, in coordination with the USFWS and the BLM, in the COM Plan.	✓	
GW-VEG-1: Joshua Tree Avoidance. Mature Joshua trees (*Yucca brevifolia*) would be avoided to the extent possible when laying out access roads in Delamar Valley.	✓	
GW-VEG-2: Monitoring within Ute Ladies'-tresses Habitat. In concert with GW-WR-3, and on BLM lands, biological and hydrologic monitoring would be required for Ute Ladies'-tresses (*Spiranthes diluvialis*) groundwater-dependent habitats in areas that may be affected by groundwater pumping.	✓	
GW-VEG-3: Wetlands Monitoring. Prior to any project pumping in Cave, Dry Lake, Delamar or Spring valleys, the SNWA would develop a wetlands monitoring plan. This plan would specify monitoring requirements and metrics for vegetation, soils, and hydrology to provide adequate baseline data to facilitate the creation of an early warning system designed to distinguish between the effects of project pumping, natural variations, and other non-project related groundwater pumping activities. This measure is in concert with GW-WR-3a. Monitoring would be conducted for all wetlands (both USACE jurisdictional and non-jurisdictional) in areas that may be affected by groundwater pumping. Specific monitoring locations would be identified in the COM Plans associated with subsequent NEPA tiers.	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Vegetation Resources		
GW-VEG-4: Phreatophytic Vegetation Monitoring in GW Development Areas. Prior to any project pumping in Cave, Dry Lake, Delamar or Spring valleys, the SNWA would develop a phreatophytie vegetation monitoring plan. This plan would speeify monitoring requirements for quantifying thc extent and distribution of phreatophytie vegetation at suffieient resolution to detect changes in density and eovcr in areas that may be affected by groundwater pumping. Baseline data derived from monitoring would faeilitate the creation of an early warning system designed to distinguish between the effects of project pumping, natural variations, and other non-project related groundwater pumping activities. Speeific monitoring locations would bc identified in the COM Plans associated with subsequent NEPA tiers. This measure is in concert with GW-WR-3a.	✓	
GW-VEG-5: Swamp Cedar Monitoring. In coneert with GW-WR-3, and on BLM lands including ACECs, biologieal and hydrologie monitoring would be required for swamp eedar (*Juniperus scopulorum*) groundwater-dependent habitats in areas that may be affected by groundwater pumping. Monitoring of these eommunities would include the determination of groundwater requirements necessary to maintain viable populations, and metrics to assess the health of individual swamp eedars. The goal of monitoring would be to ensure the long-term survival and eontinued existencc of these populations.	✓	
Terrestrial Wildlife		
ROW-WL-1: Big Game Key Habitat Priority Restoration and Habitat Improvement. If surface disturbing activities impact key big game habitats (erueial summer and winter ranges for antelope, Rocky Mountain elk, or mule deer, or oceupied desert bighorn sheep habitat), the SNWA would improve 2 aeres of comparable habitat for every 1 acre of disturbed habitat. The SNWA would eoordinate with the BLM and NDOW to determine the speeifie areas for big game key habitat improvements.	✓	
ROW-WL-2: USFWS Concurrence on Plans. The SNWA would obtain coneurrenee from USFWS on any plans developed as part of thc POD (ACM A.1.1) that address species protected under the MBTA or the BGEPA.	✓	
ROW-WL-3: Raptor Nest Survey and Avoidance. If surfaee disturbance activities may be initiated during raptor breeding and nesting seasons (as determined by the NDOW and the BLM), surveys for aetive raptor ncsts would be conducted by SNWA within suitable habitat, within 2 weeks prior to the antieipated start of surface disturbing construction activities. Raptor nests found during surveys would be addressed under the Ely RMP SS-4 management action, as well as protected under provisions of the MBTA and BGEPA as relevant. (SS-4: Where appropriatc, restrict pcrmitted activities from May 1 through July 15 within 0.5 mile of raptor nest sites unless the nest site has been determined to be inactive for at least the previous 5 years.)	✓	
ROW-WL-4: **Specific Lek Avoidance – Burying Power Lines**. For the power line in Cave Valley, the SNWA would bury the portion of the 25-kV line within the 4-mile buffer of the active leks in Cave Valley. For the power line in Snake Valley, the portion of the 25-kV line within the 4-mile buffer of the active lek would be buried. If technology at the time of construction allows, lines greater than 25-kV would also be buried.	✓	
ROW-WL-5: **Specific Lek Avoidance –Siting of Power Lines**. Outside the LCCRDA corridor, the SNWA would site 230-kV power lines west of active leks at sufficient distances to avoid line-of-sight with leks.	✓	
ROW-WL-6: **Habitat Restoration to Benefit Greater Sage-grouse for Permanently Converted Habitat**. Restore greater sage-grouse habitat on public lands at a ratio of 2 acres for every aere of PPH or PGH (or designated priority or general habitat) that is permanently eonverted. The SNWA would eoordinate with the BLM and thc NDOW to determine thc speeific areas and timing for restoration activitics.	✓	
ROW-WL-7: **Habitat Restoration to Benefit Greater Sage-grouse for Other Disturbed Habitat**. Restore greater sage-grouse habitat on public lands for PPH and PGH (or designatcd priority or general habitat) that is avoided because of temporary habitat loss due to construction and presencc of abovc ground struetures. The SNWA would coordinate with the BLM and the NDOW to determine the speeifie areas, aeres, and timing for restoration activities.	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Terrestrial Wildlife		
ROW-WL-8: Greater Sage-grouse Monitoring. In consultation with BLM, NDOW, and USFWS, SNWA would implement a monitoring program before, during, and after the construction phase for greater sage-grouse in the project area that addresses demographics, vital rates, and seasonal movement patterns, as recommended by the Nevada Energy and Infrastructure Standards to Conserve Greater Sage-Grouse (NGSCT 2010) or the most recent standards document approved prior to the start of the monitoring effort. The project area that is relevant to greater sage-grouse would be determined based on best available science at the time of the start of the monitoring effort. Currently, it would include birds using leks within 4 miles of the project area.	✓	
ROW-WL-9: Greater Sage-grouse Timing Restriction Breeding, Nesting, and Early Brood-Rearing. Restrict permitted activities within 4 miles of active greater sage-grouse leks during the breeding, nesting, and early brood-rearing periods (generally March 1 through July 31).	✓	
ROW-WL-10: Greater Sage-grouse Timing Restriction Winter Range. Restrict permitted activities from November 1 through March 31 within greater sage-grouse winter range.	✓	
ROW-WL-11: Fence Marking for Greater Sage-grouse. Fencing used by the project in greater sage-grouse habitat would be adequately marked following accepted methods and approved by BLM prior to installation.	✓	
ROW-WL-12: Co-location of Power Lines. Co-locate proposed utility lines where technically feasible.	✓	
ROW-WL-13: Eagle Nest Avoidance. Construction activities would be restricted within a 1-mile buffer zone, if a pair of breeding/nesting eagles is observed during raptor surveys. Construction may resume after eagles have fledged or the nest is abandoned.	✓	
ROW-WL-14. Pygmy Rabbit Surveys and Passive Relocation. Surveys would be conducted by qualified biologists prior to mowing and initial ground disturbance. Mowing to encourage passive relocation would be conducted between October 1 and February 15. Survey design would use the most recent BLM-approved pygmy rabbit survey and relocation protocol, and in coordination with NDOW and USFWS, include three key components: potential habitat survey; a subsequent pygmy rabbit sign survey conducted during best season for detection in Nevada; and a timeline for completion of these surveys that allows for passive relocation of rabbits ahead of initial ground-disturbing activities between October 1 and February 15.	✓	
ROW-WL-15. Pygmy Rabbit Habitat Improvement. For the direct loss of occupied pygmy rabbit habitat, 2 acres of comparable habitat for every 1 acre of disturbed habitat would be improved. SNWA would coordinate with the BLM and NDOW to determine the specific areas for pygmy rabbit habitat improvements.	✓	
ROW-WL-16. Priority Reclamation Efforts in Pygmy Rabbit Habitat. Areas of disturbance along the ROW where passive relocation activities are conducted would be evaluated by the BLM in coordination with NDOW. Based on this evaluation, SNWA would prioritize reclamation, including but not limited to the planting of sagebrush seedlings, within the areas of disturbance to facilitate movement of rabbits across the ROW. These areas would be specifically identified in the Restoration Plan (ACM A.1.69) and considered in conjunction with efforts under ACM A.5.53 (Enhance restoration for greater sage-grouse).	✓	
ROW-WL-17. Unanticipated Nesting Pygmy Rabbits. If nesting pygmy rabbits are found during construction despite efforts of passive relocation, construction activities would be restricted within an appropriate buffer zone as approved by BLM in coordination with NDOW and USFWS.	✓	
ROW-WL-18: **Coordination with NDOW on Conservation Measures for Dark Kangaroo Mouse**. The SNWA, prior to being issued the Notice to Proceed, would work with NDOW on developing research objectives, protocols, and implementation plan(s) to identify conservation measures for the SNWA project's potential effects on the dark kangaroo mouse and its habitat. The implementation plan(s) must address mitigation, minimization, or avoidance of impacts from this project on dark kangaroo mouse and its habitat for the duration of construction, maintenance, and operation. A Notice to Proceed would be issued upon receipt of confirmation by NDOW that this process has been completed and that conservation measures for the dark kangaroo mouse and its habitat have been developed.	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Terrestrial Wildlife		
ROW-WL-19: Coordination with NDOW on Conservation Measures for Banded Gila Monster. The SNWA, prior to being issued the Notice to Proceed, would work with NDOW on developing research objectives, protocols, and implementation plan(s) to identify conservation measures for the SNWA project's potential effects on the banded Gila monster and its habitat. The implementation plan(s) must address mitigation, minimization, or avoidance of impacts from this project on banded Gila monster and its habitat for the duration of construction, maintenance, and operation. A Notice to Proceed would be issued upon receipt of confirmation by NDOW that this process has been completed and that conservation measures for the gila monster and its habitat have been developed.	✓	
ROW-WL-20: Banded Gila Monster Surveys. Within potential habitat for banded Gila monster and chuckwalla, pre-construction surveys of the ROW would be conducted by qualified biologists to find and move individuals from project disturbance areas. The surveys would be conducted in accordance with NDOW's most current banded Gila monster survey protocol. All occupied burrows found in the construction zone would be examined and excavated as described for the desert tortoise. If a banded Gila monster is found, NDOW would be immediately contacted.	✓	
GW-WL-1: Avoid Siting Facilities in Key Big Game Habitats. Avoid locating wells, new roads, or other linear facilities within key big game habitats including crucial summer and winter ranges, and occupied bighorn sheep habitats. Where avoidance is not practicable, the SNWA would improve 2 acres of comparable habitat for every 1 acre disturbed.	✓	
GW-WL-2: Avoid Siting Facilities Within Buffers of Active Sage-grouse Leks. The SNWA would avoid siting facilities within 4 miles of active sage-grouse leks. Where avoidance is not possible, all power lines 33 kV or smaller within 4 miles of active greater sage-grouse leks must be buried. If technology at the time of construction allows, lines greater than 33 kV would also be buried.	✓	
GW-WL-3: Pre-construction Surveys and Avoidance of Active Burrowing Owl Burrows. Prior to siting future facilities, SNWA would conduct pre-construction surveys for burrowing owl based on habitat, known range, and previous occurrences within areas being considered for facilities. Well and other facility siting would avoid active burrows during breeding and nesting season to the extent practicable.	✓	
GW-WL-4: Pre-construction Survey and Avoidance of Pygmy Rabbit Occupied Habitat. Prior to siting future facilities, the SNWA would conduct pre-construction surveys for pygmy rabbits based on habitat, known range, and previous occurrences within areas being considered for facilities. Well and other facility siting would avoid occupied habitat to the extent practicable.	✓	
GW-WL-5: Pre-construction Survey and Avoidance of Dark Kangaroo Mouse Occurrences. Prior to siting future facilities, the SNWA would conduct pre-construction surveys for dark kangaroo mouse based on habitat, known range, and previous occurrences within areas being considered for facilities. Well and other facility siting would avoid occurrences to the extent practicable. Where impacts cannot be avoided, measures similar to those proposed by the applicant for ROW construction would be followed.	✓	
GW-WL-6: Avoid Siting Facilities within the Baking Powder Flat ACEC. The SNWA would avoid siting groundwater development facilities within the Baking Powder Flat ACEC.	✓	
GW-WL-7: Pre-construction Surveys and Avoidance of Baking Powder Flat Blue Butterfly Occurrences and Habitat. Prior to siting future facilities, SNWA would conduct pre-construction surveys for Baking Powder Flat blue butterfly based on habitat, known range, and previous occurrences within areas being considered for facilities. Well and other facility siting would avoid occurrences and habitat.	✓	
GW-WL-8: Artificial Water Sources for Big Game. If groundwater pumping by the SNWA results in the loss of existing water sources used by big game, the SNWA, in coordination with the BLM or NPS and NDOW, would develop and maintain artificial water sources to maintain current distribution of big game. Water would come from SNWA allocations.	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Terrestrial Wildlife		
GW-WL-9: Greater sage-grouse monitoring in Hamlin Valley. SNWA and BLM would coordinate with USFWS, UDWR, and NDOW to develop monitoring of the greater sage-grouse using leks in Hamlin Valley. Goals of the monitoring program would include, but not be limited to, determining if birds using Hamlin Valley leks are migratory and what, if any, groundwater dependent habitats the birds may be using.	✓	
GW-WL-10: Monitoring on BLM Lands within Greater Sage-grouse Habitat. In concert with GW-WR-3, on BLM lands, require biological and hydrologic monitoring of greater sage-grouse groundwater-dependent habitats in areas that may be affected by groundwater pumping. Hydrologic monitoring should be continuous (e.g., piezometers and soil tensiometer/piczometers) at all sites where sage-grouse habitat is being monitored.	✓	
Aquatic Biological Resources		
ROW-AB-1: Habitat Restoration. If the open-cut trenching method is used, SNWA would restore substrate composition to preconstruction conditions at the Snake Creek pipeline crossing using procedures approved by the BLM and the NDOW. The results would be included in the detailed Restoration Plan to be prepared for the project.	✓	
ROW-AB-2: Avoidance of Instream Disturbance. Construction of the power line at the Steptoe Creek crossing would avoid instream disturbance from equipment and vehicles.	✓	
ROW-AB-3: Spawning Restrictions. If the open-cut trenching method is used, timing restrictions between October 1 and December 1 would be required during pipeline construction at the Snake Creek crossing. If construction during this period is necessary, SNWA would prepare a site-specific plan that adopts mitigation measures recommended by the NDOW to minimize impacts to brown trout.	✓	
GW-AB-1: Avoid Disturbance to Springs. Avoid direct disturbance to springs and wetlands in Spring and Snake valleys with known special status aquatic species by establishing a 0.5-mile buffer around these areas.	✓	
GW-AB-2: Avoid Disturbance to Streams. Avoid locating wells, new roads or other linear facilities within 0.5 mile of or parallel to perennial streams and riparian areas with game fish and special status species.	✓	
GW-AB-3: Flow Change Mitigation. The BLM would identify specific mitigation measures during subsequent NEPA for those springs or streams with game fish or special status aquatic species where flow or water level changes are identified during modeling or monitoring. Mitigation ideas are identified as part of ACMs under adaptive management (**Appendix E**). Mitigation options are identified in the COM Plan, ACMs under adaptive management, and water resource measure GW-WR-7.	✓	
GW-MN-AB-1: Stream Flow and Aquatic Biology Monitoring. Monitor flows in game fish streams with moderate and high risks where potential pumping effects could occur. See Appendix tables F3.7-12, F3.7-15, F3.7-17, F3.7-19, F3.7-21, F3.7-23, and F3.7-25 for a list of these streams by each alternative. Monitoring measurements would include discharge and cross-sectional profiles. Cross-section data would be used to estimate flow changes on the wetted area of streams. Fish and macroinvertebrate surveys also would be conducted following methods approved by the DOI agencies and the NDOW.	✓	
GW-MN-AB-2: Spring and Aquatic Biology Monitoring. Monitor flows in moderate and high risk springs with game fish or special status species where potential pumping effects could occur. See Appendix tables F3.7-11, F3.7-14, F3.7-16, F3.7-18, F3.7-20, F3.7-22, and F3.7-24 for a list of these springs by each alternative. Cross-sectional profile measurements would be taken in the springs. Biology surveys (fish, macroinvertebrates, springsnails, and amphibians) would follow methods described in the Spring Valley Stipulated Agreement. If monitoring indicates pumping effects, alternative diversion points would be considered.	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Aquatic Biological Resources		
GW-MN-AB-3: Flow/habitat Determination. Flow- or water level-habitat relationships would be studied in selected streams and springs to determine minimum flow or water levels needed to support critical life stage of aquatic species in these habitats. The streams or springs would be selected from the list being monitored as part of the Stipulated Agreements or additional waterbodies recommended for Measures GWD-MN-AB-1 and GWD-MN-AB-2. Methods for determining minimum flows in stream habitats would be based on existing procedures involving flow-habitat measurements and flow preferences for fish species. It is anticipated that methods would need to be developed for spring habitats due to a general lack of studies.	✓	
Recreation		
ROW-REC-1: Enforce Recreational OHV Travel Restrictions. (see Mitigation Measure ROW-T-1 under Transportation) Identify construction zone and construction vehicle access areas where restrictions to unauthorized OHV travel should be enforced.	✓	
ROW-REC-2: Avoid Recreational Use Conflicts with Construction Activities. SNWA ACM 1.28 notes that a Construction Traffic Management Plan would be developed that takes into account recreation activities. The plan should schedule construction activities (pipeline and aboveground ancillary facilities) to minimize conflicts with recreation activities such as race events, hunting, and elk viewing.	✓	
ROW-REC-3: Avoid Recreational Trail Location Conflicts. SNWA would coordinate with the BLM regarding future trail use where SRMAs and SRP areas are crossed.	✓	
Transportation Resources		
ROW-T-1: Traffic Management Plan. SNWA has committed in ACMs A.1.1 and A.1.28 to prepare a detailed Traffic Management Plan that addresses operating procedures and coordination approaches with the BLM and other appropriate agencies to minimize traffic congestion, roads needing improvement and repair, and safety measures during construction. The Plan also would include: • An assessment of public road bridge weight restrictions and measures to reduce the risk of damage to existing bridges and road culverts. • A commitment to monitor and repair federal, state, and county roads that are used for delivering construction materials. • Communication procedures for notifying the public and responsible agencies of anticipated construction-related traffic and transportation issues such as temporary road closures, movement of major equipment on public roadways, and unusual levels of construction-related traffic. • Measures to manage recreational OHV use during construction, information on how closed roadways would be managed (including signage), and how roadways would be restored to prevent unauthorized OHV uses. • Submittal of the Traffic Management Plan for review and approval by the BLM and responsible county and state agencies.	✓	
Rangelands and Grazing		
ROW-GRA-1: Temporary Fencing or Closure In Livestock Use Areas. The SNWA would conduct pre-construction surveys to determine areas of livestock use in and adjacent to the construction ROW where application of temporary fencing or closure would be needed for revegetation species establishment. The results of these surveys would be provided to the BLM for review and approval. Reseeded areas that are temporarily fenced or closed would be monitored by the SNWA on a yearly basis until the BLM determines that reseeded areas are self-sustaining, and fencing removed. The time frame for reclamation monitoring is a minimum of two growing years or until the BLM determines that reclamation meets BLM BMP standards.	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Wild Horse and Burro Herd Management Areas		
ROW-WH-1: Shrub/tree Removal. In the Eagle and Silver King HMAs, where feasible, shrubs and trees within the power line ROW would be avoided during selection of power pole position and spur access road routes.	✓	
ROW-WH-2: Pre-construction Consultation. Pre-construction consultation with the BLM would occur to identify construction avoidance areas in HMAs between April and July.	✓	
ROW-WH-3: Existing Water Supplies. Pre-construction consultation with the BLM would occur to ensure that wild horses have access to existing water supplies or that temporary supplemental water is supplied until access to existing water supplies is restored.	✓	
GW–WH-1: Water Source Maintenance. In cooperation with the BLM, SNWA would identify key natural water sources and monitor those sources on a regular basis (frequency determined by the BLM). If impacts to those sources are observed, SNWA would consult with the BLM to identify locations where artificial water sources could be maintained to supply herds with adequate water supplies. This mitigation measure is not limited to impacts that are a result of the SNWA groundwater development activities.	✓	
Special Designations and Lands with Wilderness Characteristics		
ROW-SD-1: Construction Area Siting. To the degree possible, avoid siting temporary construction areas within the boundaries of special designations and within designated ROW corridors.	✓	
GW-SD-1: Avoid New Disturbance in ACECs. To the degree possible, avoid new surface disturbance in ACECs outside of utility corridors when planning well locations and roads.	✓	
Visual Resources		
ROW-VR-1: ROW Width Reduction. SNWA, in consultation with the BLM, would reduce the width of permanent ROW and temporary construction ROW to the smallest width feasible in Pahranagat Canyon, VRM Class II areas, and within 1,000 feet adjacent to scenic byways (U.S. 50/6/93) to minimize visual contrasts where feasible. The permanent and temporary ROW width can be reduced through narrower roads within the ROW, steeper trench walls, vertical trenching and/or trench boxes, and reducing the ROW width in relation to the size of the pipeline (e.g., a 16-inch pipeline would require less ROW than an 84-inch pipeline).	✓	
ROW–VR-2: Power Line Structure Design. Where locating new power lines adjacent to existing lines, the existing pole type, color, and span length would be matched to the extent feasible. In areas where there are no existing power lines, SNWA would consult with the BLM during project design to select the most appropriate structure design from the following: wood H-frame structures or single steel poles for 230-kV power lines and single wood poles or single steel poles for 69-kV and 25-kV. All steel poles would be surfaced with Shadow Grey paint in sage/creosote plant communities and self-weathering Corten in pinyon pine plant communities.	✓	
ROW–VR-3: Power Line Conductor and Insulator Design. Conductors would be non-specular and non-reflective. Insulators would be porcelain or polymer material to reduce reflection and refraction.	✓	
ROW–VR-4: Surface Treatment of Project Structures and Buildings. SNWA would consult with BLM on surface treatments. All aboveground, non-electric project structures and buildings would utilize architectural details and be painted or constructed of colored block to blend with the colors of the surrounding landscape, per BLM Manual 8400 – Visual Resources Management. Shadow Grey for sagebrush shrub and shrubland cover types and Beetle for pinyon-juniper woodland should be selected from the BLM Standard Environmental Colors Chart CC-001. Ground surfaces of permanent storage yards that would not be revegetated should have a top-dressing of 2 inches of dark colored aggregate to minimize color contrast. Non-reflective and non-glare paints would be utilized with proper treatment maintenance for the life of the project (see **Appendix F3.15** of the Final EIS for site-specific mitigation).	✓	

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Visual Resources		
ROW–VR-5: Facility Siting. SNWA would review facility site locations with the BLM to determine if design features or adjustments could be made to limit the visibility of non-linear facilities. The colocation of facilities has been incorporated into the POD; however, further adjustments for the colocation of non-linear facilities with related project facilities or existing facilities would be reviewed with the BLM. Distance, terrain, and vegetation screening would be utilized to limit the visibility of non-linear facilities. Facility siting to minimize visibility would be subject to engineering and safety requirements that may constrain siting (see **Appendix F3.15** of the Final EIS for site-specific mitigation).	✓	
GW-VR-1: Avoid Siting Facilities on Slopes. Where determined necessary by BLM for visual resource protection, groundwater development facilities would not be located on slopes greater than 5 percent.	✓	
GW–VR-2: Install Distribution Power Lines Underground. Where determined necessary by BLM for visual resource protection reasons, distribution power lines (voltages less than 33 kV) would be placed underground, when not located within high voltage transmission corridors. Underground power lines can be located within the 100-foot ROW with a minimum separation in accordance with the National Electric Safety Code Standard 353. Underground power lines should be located within the disturbed area of the permanent ROW to minimize soil disturbance and visual contrasts to the extent feasible.	✓	
GW-VR-3: Site Wellfield Facilities Away from Designated Viewing Locations. Where determined necessary by BLM for visual resource protection reasons, site groundwater development production wells, staging areas, and pumping stations more than 0.5 mile from designated viewing locations with high viewer sensitivity (e.g., scenic byways, KOPs, wilderness areas and national parks) except where they are within the temporary and permanent ROW for the main or lateral pipelines or colocated with ROW facilities. Utilize terrain to screen groundwater development facilities and avoid placing buildings on high land features and along "skylines" to conceal or reduce changes (see **Appendix F3.15** of the Final EIS for site-specific mitigation).	✓	
GW-VR-4: Site Groundwater Development Structures and Facilities in BLM VRM Class III or IV Areas. No well pads or roads would be constructed in Class I and II areas.	✓	
Native American Traditional Values		
ROW-NAM-1: Tribal Monitors. In accordance with the PA, tribal monitors would be appointed to monitor pipeline construction in the area of a site in which an Indian tribe attaches religious and cultural significance. The BLM would identify these sites in consultation with interested Indian tribes.	✓	
Socioeconomics and Environmental Justice		
ROW-SE-1: To Address Local Judicial and Law Enforcement Staffing and Equipment Needs. When SNWA develops its Emergency Management Plan (ACM A.1.1), SNWA would work with the boards of county commissioners of Lincoln, White Pine, and Millard counties to develop county-level Emergency Management Plans (and if needed, supplement law enforcement and criminal justice capabilities – including provision of multi-year grants for staff recruiting, training, payroll, and purchases of patrol vehicles, providing grants for training, purchases of ambulances, and associated equipment and communications equipment. The timing for financial assistance would correspond to the anticipated timing of major construction activity in/near the affected counties.		✓
ROW-SE-2: To Address Local Emergency Response Needs. The SNWA would work with the boards of county commissioners of Lincoln, White Pine and Millard counties to develop an Emergency Management Plan (see V-2 in Vegetation) – including providing grants for training, purchases of ambulances and other equipment. Some needs could also be addressed via requirements for contractor-provided on-site first response capabilities.		✓

Table 3.20-1 Summary of Monitoring and Mitigation Measures (Continued)

Monitoring and Mitigation Measures	Within BLM Jurisdiction	Outside BLM Jurisdiction
Socioeconomics and Environmental Justice		
ROW-SE-3: To Address Local Government Fiscal Needs. The SNWA would require all major contractors to obtain the necessary sales tax licenses and/or complete the necessary report to properly assign all major taxable purchases to the appropriate county of use/installation. The negotiated payments should be estimated in advance for the upcoming construction year, with adjustments made the following year for variances in actual outlays.		✓
ROW-SE-4: **To Address Temporary Housing Needs In The Rural Areas**. In the event that one or more temporary construction worker facilities are not developed in Lincoln County during the construction of the main pipeline and transmission line, the SNWA and its major contractors would work cooperatively with the Board of County Commissioners to identify temporary housing resources, and secure additional resources if required, e.g., provide direct funding or occupancy commitment for one or more RV parks.		✓
ROW-SE-5: **To Assist Local Counties and Communities Planning Efforts**. The SNWA and its contractors would prepare and distribute an annual socioeconomic monitoring report summarizing its construction activities during the past year, planned activity over the next 2 years, and key characteristics of its work force, e.g., level of employment (low, peak, average), residency patterns, turnover rates, and impacts on local communities. Representatives of local governments and service providers, for instance, the board of County Commissioners and town mayors, should be consulted regarding the scope and details addressed in this monitoring report.		✓
GW-SE-6: To Provide a Source Of Emergency Financial Assistance and Equitable Treatment of Potentially Affected Ranchers and Public Water Systems that Rely on Groundwater. SNWA would create and fund a mitigation/protection program for holders and users of water rights in Nevada comparable to that proposed for water rights holders in Utah outlined in the draft Nevada/Utah Snake Valley agreement. Examples of future needs include providing funding to provide emergency water or develop a new community water well in case of a project-related impact.		✓
GW-SE-7: To Provide a Source Of Emergency Financial Assistance to Individual Businesses Adversely Affected By Factors Linked to Groundwater Drawdown. SNWA should expand the impact assistance and compensation program to compensate/provide economic relief to individual businesses for losses due to business interruption or other factors that are reasonably linked to groundwater drawdown.		✓
GW-SE-8: To Promote Income Stability and Long-Term Sustainability of Local Agricultural Industry. SNWA should work cooperatively with DRI, University of Nevada - Reno, University of Utah, USDA, and others to assist farmers and ranchers to implement water conservation practices and to transition to higher value, less water consumptive crops.		✓
GW-SE-9: To Facilitate Local Planning and Ensure Timely Response in the Event of Problems. A cooperative effort should be undertaken by the respective state engineers of Nevada and Utah, SNWA, and White Pine, Lincoln, and Millard counties, to develop and implement a comprehensive socioeconomic monitoring program as an adjunct to the stipulated agreement for Spring Valley and proposed 3M Plan for Snake Valley. This effort could include creation of an "Ombudsmen" position, perhaps within the NSE, to ensure public access and timely response regarding groundwater issues.		✓
GW-SE-10: To Help Maintain Local Government Fiscal Strength. If SNWA purchases additional private property or pays another party to establish a permanent conservation easement on productive agricultural or timber lands that results in a reduction in taxable value, SNWA should provide annual "payments in lieu of taxes" to the affected county to offset any resulting reductions in ad valorem taxes.		✓
Public Safety and Health		
ROW-PS-1: Hazardous Material Surveys. SNWA would conduct BLM-approved hazardous materials-contaminant surveys before establishing final pipeline ROW locations.	✓	
ROW-PS-2: **Five-year Review of Leak Detection Methodologies**. SNWA would review and implement best industry practices for leak detection.	✓	

3.20.3 COM Plan

This section describes a comprehensive monitoring, management, and mitigation program that addresses all hydrographic areas and all facilities associated with the SNWA groundwater development project. The intent of the COM Plan is to protect federal resources and federal water rights that may be impacted by construction, operation, and maintenance, and abandonment of the project. The COM Plan would be developed by the BLM, based on SNWA's final POD and in coordination with other agencies to meet the goals and objectives described below.

COM Plan Goals and Objectives

Goals

- Ensure that the GWD Project complies with the FLPMA, Sec. 504. [43 USC 1764] (a)(4), which states that the ROW would do no unnecessary damage to the environment;
- Ensure compliance with BLM's other resource protection requirements, as described in Section 3.20.1 (i.e. RMPs, watershed plans, and resource policy and regulations, etc.);
- Identify all mitigation, monitoring, and management requirements for the GWD Project main conveyance pipeline Tier I ROW grant in one document;
- Outline a process, including schedules, sources of funding, and performance standards, for developing additional mitigation, monitoring, and management requirements for future ROW grants; and
- Provide agencies with insight concerning the integration of the resource issues and importance of regional monitoring and mitigation for subsequent tiered NEPA processes, as the GWD Project is developed.

Objectives

- Protect federal resources that may be impacted by construction, operation, maintenance, and abandonment of the project;
- Protect federal water rights managed by federal agencies;
- Avoid, minimize, or mitigate adverse environmental impacts to groundwater-dependent ecosystems and biological communities;
- Avoid, minimize, or mitigate the effects of actions that could contribute to the need to list species as threatened or endangered under the ESA;
- Avoid adverse environmental impacts that could cause jeopardy to listed species or destruction or adverse modification of designated critical habitats;
- Avoid, minimize, or mitigate adverse environmental impacts to habitat for fish and wildlife;
- Avoid, minimize, or mitigate degradation of visibility and air quality due to potential increases in airborne particulates and loss of surface vegetation;
- Avoid, minimize, or mitigate impacts to cultural and visual resources;
- Provide a process for mitigating impacts;
- Identify triggers for early warning of potential adverse impacts, including an analysis of whether early-warning indicators for groundwater withdrawal thresholds have been reached or whether data trends indicate early warning thresholds would likely be reached in the near future under current conditions and whether SNWA groundwater withdrawals are the likely cause of or contributor to this, based on the best scientific information available;
- Allow flexibility to implement management and mitigation measures;
- Monitor the effectiveness of mitigation measures in achieving expected outcomes and reducing impacts to resources; and
- Implement adaptive management as needed to achieve the goals stated above.

As COM plans are developed, the goals and objectives listed above would be utilized along with additional monitoring from the subsequent NEPA review to develop site-specific management, monitoring, and mitigation required for the GWD Project.

COM Plan Conceptual Outline

Both the main water conveyance pipeline (tier I) and groundwater development-specific COMs (subsequent NEPA tiers) are expected to be developed using this conceptual outline. It is expected that modifications of the following outline would occur when the COM Plan is prepared. The following is the conceptual outline:

- **Introduction**
  - Relationship with Other Environmental Documents/ Protective Measure Processes, Authorization, Permits, Reviews, and Approvals, etc.
- **Project Management**
  - Roles and Responsibilities, Communication Procedures, and Protocols
- **Project Construction**
  - Pre-construction Activities
    - Biological and cultural resource surveys
    - Identification of existing monitoring sites needed in establishing baseline conditions
    - Identification of additional monitoring needed to build full sets of baseline data
    - Development of triggers or environmental indicators and adaptive management thresholds
  - Construction Activities
    - Mitigation Activities
    - Restoration
  - Variance Process
- **Project Operation and Maintenance**
  - Inspections and Maintenance
  - Ongoing Studies – Baseline and Data Gaps
    - Processes for sharing monitoring data with interested parties
    - Description of interrelated monitoring, management, and mitigation activities that would begin at later stages of project development

3.20.3.1 Development and Implementation Process

Background

SNWA submitted a Draft POD with its application for the main conveyance pipeline and associated facilities, which contained their proposed ACMs. After the ROW application and Draft POD were accepted by the BLM, a NEPA review on the proposed project was conducted. The BLM will issue a ROD upon completion of other requirements. The ROD will contain the appropriate monitoring and mitigation from the Final EIS. Based on the Final EIS and the ROD, a ROW grant may be issued. The integration of the COM Plan into the project is shown in **Figure 3.20-2**.

Issuance of the ROW grant would require that SNWA submit a final POD to the BLM for approval. BLM would only approve a POD that incorporates mitigation identified in the ROD for the main conveyance pipeline and associated facilities and a construction and operation schedule. It must also include all design and reports required through the NEPA process, such as the reclamation plan, transportation plans, construction plans, resource-specific monitoring

plans, weed management plan, health and safety plans, and biological survey protocols, etc. BLM would issue the Notice to Proceed once all terms and conditions of the ROW grant are fulfilled.

The final POD, while initially focused on the main conveyance pipeline, should include potential baseline/ data gap monitoring for subsequent NEPA tiers. The BLM would coordinate with the partner agencies (as provided under "COM Plan Preparation" below) to refine baseline and data gap information needs to better inform subsequent NEPA analysis. Such information may be obtained by, and may include, but is not limited to:

- Conducting surveys for northern leopard frog in pertinent springs in the GWD Project Region of Study for the purpose of identifying new locations of populations.
- Investigating important aspects of northern leopard frog ecology and demographics.
- Conducting surveys for special status springsnails in pertinent springs in the GWD Project Region of Study for the purpose of identifying new locations of populations.
- Defining ecological water requirements for the groundwater-dependent ecosystems that special status species depend upon.
- Conducting supplemental baseline water resource monitoring including collecting water quantity (i.e. flow) and quality data to characterize baseline water resource conditions at locations where special status species are known to exist.
- Conducting additional surface water and groundwater monitoring hydrogeologic characterization studies, and aquifer testing to improve the predictive abilities of the numerical groundwater flow models.
- Completing wetland inventory using Cowardin (or currently accepted method) classification of wetlands to ensure necessary information is available for the development areas and areas expected to be impacted by groundwater pumping. Based upon this assessment, SNWA could set up a mitigation bank to offset any expected loss of wetland acres.
- Other activities, data, or information as may be identified through the subsequent NEPA process.

COM Plan Preparation

Following issuance of the ROD and the ROW grant, and approval of the Final POD, the COM Plan would be developed. The COM Plan would identify monitoring, mitigation, and management requirements relating to the construction, operation, and maintenance of the main conveyance pipeline and related facilities that were considered under the Tier I NEPA process and other regulatory processes that apply to the ROW grant. Upon completion of the COM Plan, Notices to Proceed could be issued for construction of the main conveyance pipeline.

The BLM, working in conjunction with other federal, state, local, and tribal agencies/governments (hereinafter collectively referred to as agencies) and operating as defined by a future MOU between the BLM and the agencies, would develop the COM Plan. BLM also would coordinate with USFWS relative to listed and selected BLM sensitive species. The COM Plan would be a dynamic document, designed to be revised over the duration of construction and operation of the GWD Project, as data are collected and facilities are proposed. The COM Plan would include a monitoring schedule and plan for BLM cost recovery, and establish reporting requirements for SNWA, including provisions for annual meetings to review construction and operation of the ROW. The BLM expects to establish key working groups to develop sections of the COM Plan related to water resources, biologic resources and air resources and to assist in establishing an adaptive management procedure to recommend adjustment of monitoring, management, and mitigation actions to the BLM. The COM Plan would reflect a staged approach to implement monitoring, management, and mitigation activities.

The process described in this subsection would be followed for submittal of additional ROW requests by SNWA. Future groundwater development may require a new COM Plan or amendment of the existing COM Plan. The COM Plan may be supplemented and amended upon approval of future groundwater development ROWs and related PODs (subject to subsequent NEPA).

COM Plan Implementation

The steps for integrating the COM Plan into the project are outlined in **Figure 3.20-2**. The roles and responsibilities of the BLM and other interested parties, as well as the overall concept of adaptive management, which would allow for management changes in response to the results of environmental monitoring programs are discussed below.

BLM COM Plan Authority

Upon approval of the first and subsequent ROW grants, the BLM would implement the COM plans including regularly scheduled interaction with the MOU partners and other involved parties. The BLM would serve as the lead federal agency, and would designate a BLM Project Manager (Authorized Officer) who would provide oversight for the project. The BLM Project Manager would, on behalf of the BLM, be responsible for administering and enforcing ROW grant and permit provisions for the BLM, including the mitigation measures and conditions of approval contained in the COM plan. The BLM Project Manager also would be responsible for written stop-and-resume work orders, and resolving any conflicts that arise relating to the project on land administered by the BLM. Compliance would be monitored by the BLM Project Manager and other BLM resource specialists, as needed, in conjunction with the Compliance Inspector Contractor. The Compliance Inspector Contractor likely would be a third-party contractor selected by BLM.

Adaptive Management

The adaptive management process is expected to be used to minimize future environmental impacts. This includes periodic review and revision of programmatic policies and BMPs; comprehensive site monitoring programs; including metrics for measuring impacts; and protocols for incorporating monitoring observations and new mitigation measures into standard operating procedures and project specific stipulations.

As part of the adaptive management process, evaluation factors would need to be included to determine and measure the effectiveness of the overall adaptive management strategy. These evaluation factors could include such items as mitigation and monitoring measures and their ability to respond to the potential impacts.

It is also important to note that adaptive management is an available tool, but it does not replace the BLM authority and duties under FLPMA to protect and manage federal resources.

Interagency Input

The agencies and the key working groups would participate in development and implementation of the COM plans. The agencies will be asked to review that information in light of the BLM resource management standards and goals and identify where the COM plans need to be strengthened or modified. The agencies would periodically review monitoring reports and data made available by SNWA and BLM. The key working groups would be made up of resource specialists with expertise for resources of concern.

Prior to initiating the subsequent NEPA tiers, the BLM would coordinate with the agencies to define data gaps and obtain input on strategies to remedy the data issues. BLM would determine how to resolve the data gaps and inform SNWA. All parties recognize that several years of data collection for a variety of resources may be necessary.

The BLM would then consider the interagency input as it makes future decisions on implementation of the COM Plan (**Figure 3.20-2**). Because project-related impacts may not become evident for many years after implementation of groundwater development, the BLM's intent is to maintain the required COM plans and periodic interagency review for the life of the project.

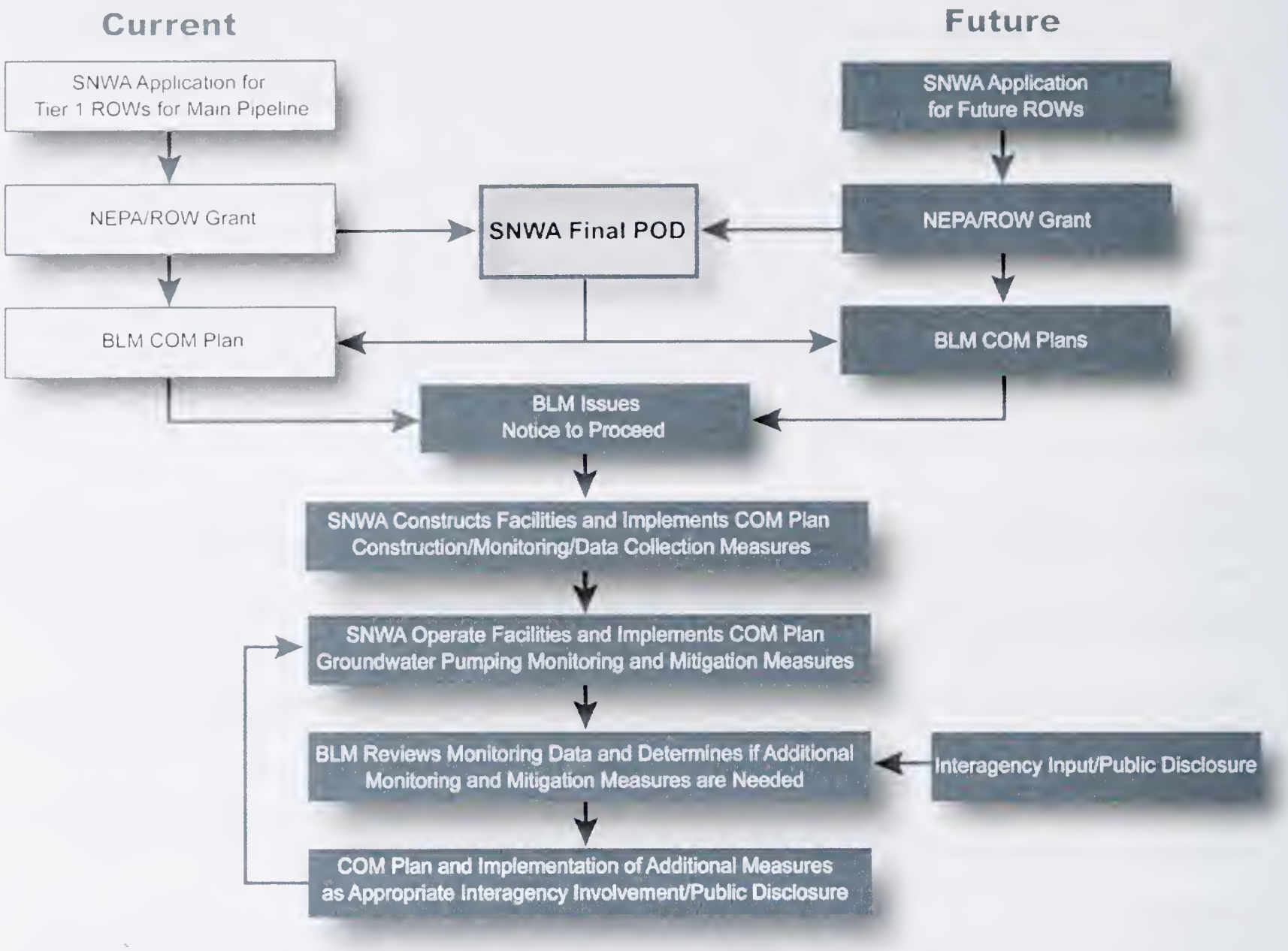

Figure 3.20-2 Integration of the COM Plan into the Project

Public Disclosure

The public would be kept informed of the development and implementation of the COM Plan. Copies of the COM plans, compliance and monitoring reports, supporting documents, and data would be made available to the public via the BLM GWD Project website and BLM would respond to public inquiries regarding mitigation and monitoring.

3.20.4 Enforcement of Decisions

The BLM, as the Federal Land Manager, enforces the ROW grant through terms and conditions. Throughout the life of the project it would be the BLM's responsibility to conduct compliance reviews of the project to ensure the terms and conditions of the ROW grant have been met. Any noncompliance issues would be brought to SNWA's attention and they would have appropriate time to resolve the notice of noncompliance. If SNWA does not bring the ROW into compliance to BLM's satisfaction, the BLM may initiate actions under its authority to suspend SNWA's ROW until SNWA can remedy the issues of non-compliance. Depending upon the non-compliance issue, SNWA would not be allowed to operate the ROW until the issues of non-compliance are remedied and the BLM issues a Notice to Proceed. If non-compliance continues, SNWA would not be granted any further ROWs, permits, or other land use authorizations from BLM until all non-compliance issues are resolved.

The BLM enforcement authority includes the ability to require:

- Geographic redistribution of groundwater withdrawals;
- Reduction or cessation in groundwater withdrawals;
- Augmentation of water supply for federal resources and federal water rights; and
- Use recharge projects to offset local groundwater drawdown.

3.20.4.1 Compliance with the FLPMA

The BLM manages surface and mineral resources for federal lands it administers under the FLPMA and applicable regulations. The COM Plan is developed and implemented in compliance with the FLPMA, which is a mechanism through which project performance can be comprehensively reviewed and corrective actions implemented. When a ROW grant is issued for a project, FLPMA requires the following:

"Each right-of-way shall contain–(b) such terms and conditions as the Secretary concerned deems necessary to (i) protect Federal property and economic interests; (ii) manage efficiently the lands which are subject to the right-of-way or adjacent thereto and protect the other lawful users of the lands adjacent to or traversed by such right-of-way; (iii) protect lives and property; (iv) protect the interests of individuals living in the general area traversed by the right-of-way who rely on the fish, wildlife, and other biotic resources of the area for subsistence purposes; (v) require location of the right-of-way along a route that will cause least damage to the environment, taking into consideration feasibility and other relevant factors; and (vi) otherwise protect the public interest in the lands traversed by the right-of-way or adjacent thereto." SEC. 505. [43 USC 1765]

BLM is also generally obligated to avoid unnecessary or undue degradation of the public lands. [43 U.S.C. § 1732]

ROW Regulations under FLPMA

The regulations (43 CFR 2805.12) outline the terms and conditions that are to be included in the grant and are the proponent's responsibilities. The regulation states: "By accepting a grant, you agree to comply with and be bound by the following terms and conditions. During construction, operation, maintenance, and termination of the project …" The section then outlines the various areas that would be potential in the development of the grant. Section 43 CFR 2805.12(i) provides that the proponent must "Comply with project-specific terms, conditions, and stipulations, including requirements to: (1) Restore, revegetate, and curtail erosion or conduct any other rehabilitation measure BLM determines necessary; (2) Ensure that activities in connection with the grant comply with air and water quality standards or related facility siting standards contained in applicable Federal or state law or regulations; (3) Control or prevent damage to: (i) Scenic, aesthetic, cultural, and environmental values, including fish and wildlife habitat; (ii) Public and private property; and (iii) Public health and safety; … (p) Comply with all other stipulations that BLM may require."

3.20.4.2 Compliance Inspector Contractor

The Compliance Inspector Contractor is an on-the-ground agent of the BLM, providing onsite compliance inspections and monitoring for the project during construction. This service will help promote environmental protection and ensures compliance with the lead federal agency's requirements based on the commitments, as established in the COM plan. The Compliance Inspector Contractor would report directly to the BLM, who would coordinate with other federal, state, local, and tribal agencies/governments, as appropriate. The duties of the Compliance Inspector Contractor are to:

- Prepare a project compliance plan;
- Coordinate the Notice-to-Proceed meeting(s);
- Prepare and maintain the project Key Contacts List;
- Schedule periodic meetings with the BLM Project Manager and resource specialists;
- Conduct daily field inspection of the project areas;
- Coordinate with biological, botanical, paleontological, cultural resource, dust control, and other environmental resource specialists/monitors;
- Complete a daily compliance inspection report and submittal of a weekly summary report to the BLM and Project Proponent;
- Attend construction meetings;
- Review variance requests; and
- Complete the End of Construction Project Report.

After project construction is complete, the Compliance Inspector Contractor would periodically monitor compliance with operational and mitigation requirements, and report back to BLM.

3.20.5 Summary

It is anticipated that the COM Plan monitoring measures for the ROW grant in Tier I would provide early warning of potentially adverse impacts to federal water rights and federal resources and provide time and flexibility to implement management measures to mitigate those impacts. Subsequent NEPA tiers would likely develop more specific monitoring and mitigation measures. However, since groundwater development presumes some level of vegetation change and reduction in groundwater levels, not all impacts may be avoided. The COM Plan may include mitigation measures offered by SNWA to mitigate impacts that occur to lands, water rights, and water-dependent resources owned by private parties, local governments, and state governments. However, the BLM cannot enforce mitigation measures on lands owned by other parties, and cannot ensure that the funding and land access necessary to implement these measures would be made available.

4. Irreversible and Irretrievable Commitments of Resources

This section describes the irreversible and irretrievable commitments of resources associated with implementing the Proposed Action and Alternatives A through F. Irreversible and irretrievable resource commitments are related to the use of nonrenewable and renewable resources and the effects that the uses of these resources have on future generations. The commitment of resources refers primarily to the use of nonrenewable resources such as fossil fuels, water, labor, and electricity. Renewable resources are included in this analysis due to their importance to the region of study's natural resources. Irreversible effects primarily result from the use or loss of a specific resource that cannot be replaced within a reasonable time frame. Irreversible commitment of resources addresses the potential loss of future options for resource development or management, especially of nonrenewable resources such as minerals or cultural resources.

Summaries of the irreversible and irretrievable commitments of resources are provided in two separate tables. **Table 4.0-1** includes the irreversible and irretrievable information for ROWs and ancillary facilities. Information for potential irreversible and irretrievable commitments of resources for groundwater pumping is presented in **Table 4.0-2**. Both tables also include impact summaries and impact parameters that show differences among alternatives. Without knowing the location of future groundwater development facilities, statements on irreversible and irretrievable commitments of resources associated with these facilities will be described in subsequent NEPA documents. The same types of irreversible and irretrievable commitments of resources that are identified for ROWs would be applicable to surface disturbance from future groundwater development activities.

The following information summarizes surface disturbance effects and long-term commitment of land to industrial uses for the ROWs and ancillary facilities.

> **ROW Surface Disturbance: Proposed Action and Alternatives A – C = 12,288 Acres; Alternative D = 8,828 acres; and Alternatives E and F = 10,681 acres**. These acres represent the estimated total surface disturbance from construction and operation of all ROW facilities included in the Tier 1 NEPA analysis for the main pipeline, and associated operational facilities (transmission lines, access roads, and other project facilities). This total surface disturbance area applies to effects on individual resources (e.g., soils, vegetation, wildlife habitat, and visual resources).
>
> **Aboveground Facilities: Proposed Action and Alternatives A through C = 999 Acres; Alternative D = 808 acres; and Alternatives E and F = 945 acres**. These acres represent the estimated total area of land committed to permanent aboveground facility uses. It is assumed that all other disturbed land would be revegetated and available for prior uses (e.g., wildlife habitat, grazing).

Constructing, operating, and maintaining the Proposed Action or other action alternatives would require committing land, soil, and vegetation to place permanent operational facilities, including pipelines, wells, access roads, structures, and power lines. While it is possible that the natural landscape could be restored after these facilities are removed, it is unlikely in the foreseeable future. Therefore, these structures would constitute an irretrievable commitment of land. In accordance with the LCCRDA and the SNPLMA, the ROW is granted in perpetuity. Termination and abandonment are not anticipated, unless exceptional circumstances should arise. Therefore, potential future abandonment or closure of project facilities is not considered in the evaluation of irreversible and irretrievable commitment of resources.

Consumption of fossil fuels and energy would occur during construction and operation activities. Fossil fuels (gasoline and diesel) would be used to power construction equipment and vehicles. Electrical power would be used for lighting and operations. The energy consumed for the project construction and operation represents a permanent and non-renewable commitment of these resources.

Materials for construction of new facilities and associated private-sector economic and population growth would comprise an irretrievable commitment for the life of the project. Use of these materials represents a further depletion of natural resources. Construction and maintenance activities are considered a long-term non-renewable investment of these resources.

Development and operation of the GWD Project would require the commitment of natural, human, and monetary resources. Most of the non-monetary resource investments would be irretrievable, and their use may preclude or foreclose other opportunities. Meeting the demands for goods and services indirectly associated with the project would also be irreversible, although some reuse may occur. As described in **Table 4.0-2**, groundwater pumping could potentially result in the irreversible and irretrievable loss of spring and stream resources and associated environmental resources that depend on this surface water as a drinking source, habitat, or other ecological requirement. The extent of these potentially irreversible and irretrievable losses cannot be accurately quantified during this initial NEPA analysis because the effectiveness evaluations of mitigation must be determined in a more specific level. As the monitoring and mitigation process proceeds (see Section 3.20) prior to and during subsequent NEPA evaluations, the effectiveness of the stipulated agreements, ACMs, and additional mitigation would be quantified. This effectiveness determination can be used to better predict the irreversible and irretrievable loss of resources associated with site-specific groundwater development facilities. As part of this EIS, the impact parameters can be used to indicate those alternatives with potentially higher risks of impacts and the associated potentially irreversible and irretrievable loss of environmental resources.

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Table 4-1 Irreversible and Irretrievable Impacts Associated with Surface Disturbance Impacts of the Proposed GWD Project - ROW and Ancillary Facilities

Resource	ROW and Ancillary Facilities			Irreversible and Irretrievable Commitment of Resources
	Proposed Action and Alternatives A, B, and C	Alternative D	Alternatives E and F	
Air	Air pollutant emissions from construction equipment over an area of approximately 12,288 acres and an 8-year period.	Air pollutant emissions from construction equipment over an area of approximately 8,828 acres and a 6-year period.	Air pollutant emissions from construction equipment over an area of approximately 10,681 acres and a 6-year period.	Project facility construction equipment or operation emissions would not exceed federal or state air quality standards. Local air quality would return to existing conditions after completion of project construction. Therefore, construction would not result in irreversible or irretrievable effects on air quality.
	Slight increase in air pollutant emissions from operation and maintenance activities.	Slight increase in air pollutant emissions from operation and maintenance activities, at a reduced scale.	Slight increase in air pollutant emissions from operation and maintenance activities, at a reduced scale.	
	Minor contribution of greenhouse gas emissions.	Minor contribution of greenhouse gas emissions.	Minor contribution of greenhouse gas emissions.	
Geology/ Paleontology	Even if trench monitoring is implemented, some scientifically valuable fossils would be disturbed and lost during trench excavation and ROW grading over a distance of approximately 150 miles.	Same type of impact as the Proposed Action and Alternatives A through C except that ROWs would not occur in White Pine County.	Same type of impact as the Proposed Action and Alternatives A through C except that ROWs would not occur in Snake Valley.	Project facility construction and operation would not cause irreversible or irretrievable effects on geological resources. Surface disturbance activities could alter paleontological resources and result in irreversible or irretrievable effects.
Water	Channel alteration and potential water quality effects on one perennial stream crossed by the pipeline ROW.	No perennial streams crossed by the pipeline ROW.	No perennial streams crossed by the pipeline ROW.	Project facility construction and operation would not result in irreversible or irretrievable effects on surface water resources. The use of water for dust control would be an irreversible loss of this resource.
	Potential water quality effects on two perennial streams by the power line ROW.	No perennial streams crossed by the power line ROW.	No perennial streams by the power line ROW.	
	Potential channel alteration and water quality effects on numerous intermittent and ephemeral streams by the pipeline and power line ROWs.	Fewer intermittent streams crossed by the pipeline and power line ROWs.	Fewer intermittent streams crossed by the pipeline and power line ROWs.	

Table 4-1 Irreversible and Irretrievable Impacts Associated with Surface Disturbance Impacts of the Proposed GWD Project - ROW and Ancillary Facilities (Continued)

Resource	ROW and Ancillary Facilities			Irreversible and Irretrievable Commitment of Resources
	Proposed Action and Alternatives A, B, and C	Alternative D	Alternatives E and F	
Soils	Disturbance to the following acres of sensitive soils: highly wind erodible (1,476), highly water erodible (615), compaction prone (123), and low revegetation potential (10,211).	Disturbance to same types of sensitive soils but fewer acres.	Disturbance to same types of sensitive soils but fewer acres.	There would be a loss of soil productivity due to alteration and mixing of the soil horizons during construction on approximately 8,828 to 12,288 acres, resulting in an irretrievable commitment of this resource. There would also be an irreversible and irretrievable commitment of the resource on approximately 808 to 999 acres involving permanent structures, roads, and facilities that would not be reclaimed.
	Disturbance to approximately 2,338 acres of soil with prime farmland characteristics (no currently active cropland would be affected).	Disturbance to 2,295 acres of soils with prime farmland characteristics (no currently active cropland would be affected).	Disturbance to 2,350 acres of soils with prime farmland characteristics (no currently active cropland would be affected).	
Vegetation	Removal of approximately 12,288 acres of vegetation during construction. Permanent removal of 999 acres due to facility installation.	Removal of approximately 8,828 acres of vegetation. Permanent removal of 808 acres due to facility installation.	Removal of approximately 10,681 acres of vegetation. Permanent removal of 945 acres due to facility installation.	Project facility construction would result in irretrievable effects on 8,828 to 12,288 acres of vegetation because of its removal and long-term restoration period. There would be an irreversible and irretrievable commitment of resources on approximately 808 to 999 acres involving permanent structures, roads, and facilities that would not be reclaimed.
	Potential spread of noxious weeds due to construction equipment.	Potential spread of noxious weeds due to construction equipment, but affected area would be 25 percent less than the Proposed Action and Alternatives A through C.	Potential spread of noxious weeds due to construction equipment, but affected area would be 20 percent less than the Proposed Action and Alternatives A through C.	
	Potential fire risk due to construction areas.	Potential fire risks due to construction equipment, but affected area would be 25 percent less than the Proposed Action and Alternatives A through C.	Potential fire risks due to construction equipment, but affected area would be 20 percent less than the Proposed Action and Alternatives A through C.	
	Salvage and potential loss of yucca and cacti in disturbance areas.	Same as the Proposed Action and Alternatives A through C.	Same as the Proposed Action and Alternatives A through C.	
	Potential disturbance to six BLM sensitive plant species populations.	Same as the Proposed Action.	Same as the Proposed Action.	

Table 4-1 Irreversible and Irretrievable Impacts Associated with Surface Disturbance Impacts of the Proposed GWD Project - ROW and Ancillary Facilities (Continued)

Resource	ROW and Ancillary Facilities			Irreversible and Irretrievable Commitment of Resources
	Proposed Action and Alternatives A, B, and C	Alternative D	Alternatives E and F	
Wildlife	Big game range construction impacts include: antelope (7,950 acres), elk (4,019 acres), mule deer (3,918 acres), and desert bighorn sheep (285 acres).	Big game range construction impacts are reduced: antelope (4,571 acres); elk (2,704 acres); mule deer (2,949 acres); desert bighorn sheep (260 acres).	Big game range construction impacts are reduced: antelope (6,345 acres); elk (4,019 acres); mule deer (3,547 acres); desert bighorn sheep (260 acres).	There would be an irretrievable reduction in wildlife habitat of approximately 8,828 to 12,288 acres as the result of construction surface disturbance. Of this total, there would be an irreversible and irretrievable commitment of approximately 808 to 999 acres of wildlife habitat associated with permanent structures, roads, and facilities that would not be reclaimed.
	Habitat impacts for special status wildlife species (desert tortoise, sage-grouse, pygmy rabbit, western burrowing owl, bald eagle, golden eagle, ferruginous hawk, bats, dark kangaroo mouse, Gila monster, and Mojave poppy bee).	Habitat impact for special status wildlife species reduced by 23 to 59 percent. Mojave poppy bee impacts would be the same.	Habitat impact for special status wildlife species reduced by 20 to 50 percent. Mojave poppy bee impacts would be the same.	
	Operation of electrical power lines could result in bird collisions, electrocution, and increased predation on desert tortoise, pygmy rabbit, and other wildlife species.	Same potential impacts as listed for the Proposed Action.	Same potential impacts as listed for the Proposed Action.	
Aquatic Biology	Habitat alteration and potential water quality effects on one perennial stream containing game fish species crossed by the pipeline ROW.	No perennial streams crossed by the pipeline ROW.	No perennial streams crossed by the pipeline ROW.	ROW and facility construction and operation would result in short-term effects on aquatic habitat and species. As a result, there would be no irreversible or irretrievable effects on aquatic biological resources.
	Potential water quality effects on two perennial streams containing game fish species crossed by the power line ROW.	No perennial streams crossed by the power line ROW.	No perennial streams crossed by the power line ROW.	

Table 4-1 Irreversible and Irretrievable Impacts Associated with Surface Disturbance Impacts of the Proposed GWD Project - ROW and Ancillary Facilities (Continued)

Resource	ROW and Ancillary Facilities			Irreversible and Irretrievable Commitment of Resources
	Proposed Action and Alternatives A, B, and C	Alternative D	Alternatives E and F	
Aquatic Biology (Continued)	Potential habitat alteration and water quality effects on numerous intermittent streams potentially containing macroinvertebrates crossed by the pipeline and power line ROWs.	Fewer intermittent streams potentially containing macroinvertebrates crossed by the pipeline and power line ROWs.	Fewer intermittent streams potentially containing macroinvertebrates crossed by the pipeline and power line ROWs.	
	Potential amphibian mortalities near waterbodies from vehicle traffic within the ROWs (431 miles).	Potential amphibian mortalities near waterbodies from vehicle traffic within the ROWs (315 miles).	Potential amphibian mortalities near waterbodies from vehicle traffic within the ROWs (388 miles).	
Land Use	Disturbance to 12,288 acres of which 97 percent is managed by the BLM.	Disturbance to 8,828 acres of which 97 percent is managed by the BLM.	Disturbance to 10,681 acres of which 97 percent is managed by the BLM.	Project facility construction would result in an irreversible and irretrievable loss of approximately 808 to 999 acres of land due to the permanent use of land for structures, roads, and ancillary facilities that would not be reclaimed.
	Disturbance to 8.5 acres of agricultural land.	Disturbance to 8.5 acres of agricultural land.	Disturbance to 8.5 acres of agricultural land.	
	Approximately 25 percent of disturbance located outside of designated utility corridors.	Approximately 10 percent of disturbance located outside of designated utility corridors.	Approximately 15 percent of disturbance located outside of designated utility corridors.	
Recreation	Effects on access for OHV race routes.	Effects on access for OHV race routes in Lincoln County only.	Same as the Proposed Action and Alternatives A through C.	Project facility construction would result in an irretrievable loss of approximately 2,448 acres of native vegetation within designated recreation areas. There would be an irreversible and irretrievable commitment of recreation resources on approximately 257 acres involving permanent structures, roads, and facilities that would not be reclaimed.
	Disturbance to the Caliente Special Recreation Permits, Chief Mountain Special Recreational Management Areas (SRMA), Las Vegas Valley SRMA, Loneliest Highway SRMA, Pioche Special Recreation Permits, and Steptoe Valley Wildlife Management Area.	Same as the Proposed Action and Alternatives A through C except the Loneliest Highway SRMA and Steptoe Valley Wildlife Management Area would not be crossed.	Same as the Proposed Action and Alternatives A through C.	
Minerals	Potential short-term reductions in access to minerals and minor use of sand and gravel supplies.	Same as Alternatives A through C except that no impacts would occur in Snake Valley and most of Spring Valley.	Same as Alternatives A through C except that no impacts would occur in Snake Valley.	Small quantities of sand and gravel could be used during project construction. This would be an irreversible use of this resource.

Table 4-1 Irreversible and Irretrievable Impacts Associated with Surface Disturbance Impacts of the Proposed GWD Project - ROW and Ancillary Facilities (Continued)

Resource	ROW and Ancillary Facilities			Irreversible and Irretrievable Commitment of Resources
	Proposed Action and Alternatives A, B, and C	Alternative D	Alternatives E and F	
Rangeland	Total of 23 grazing allotments involving approximately 10,544 acres.	Total of 14 grazing allotments involving 7,083 acres.	Total of 20 grazing allotments involving 8,937 acres.	There would be an loss of approximately 7,083 to 10,544 acres as the result of surface disturbance within BLM grazing allotments. These losses would be slowly reduced as the ROW is restored over the time period required for vegetation recovery. There would be an irreversible and irretrievable commitment of resources on approximately 562 to 708 acres for permanent facilities.
	Long-term disturbance to 708 acres in 18 allotments.	Long-term disturbance to 564 acres in 11 allotments.	Long-term disturbance to 562 acres in 16 allotments.	
Wild Horses	Two herd management areas (HMAs) crossed by ROWs, involving 3,015 acres; long-term loss of 164 acres within 2 HMAs.	Same as the Proposed Action and Alternatives A through C.	Same as the Proposed Action and Alternatives A through C.	Project facility construction would result in an loss of approximately 3,015 acres of wild horse forage and cover habitat within two Horse Management Areas. These losses would be slowly reduced as the ROW is restored over the time period required for vegetation recovery. There would be an irreversible and irretrievable commitment of 164 acres for permanent structures.
Special Designations	Project surface disturbance within two Special Designations: Coyote Springs ACEC and Kane Springs ACEC.	Same as the Proposed Action and Alternatives A through C	Same as the Proposed Action and Alternatives A through C	There would be an irreversible and irretrievable loss of vegetation and wildlife habitat in up to seven special designations due to construction and operational maintenance of permanent structures.
Visual	Changes in landscape appearance on approximately 12,288 acres due to removal of shrub vegetation in ROWs. These changes may be observed from scenic byways (Highways 93, 6, and 50) over long viewing periods.	Changes on approximately 8,828 acres due to removal of shrub vegetation in ROWs. These changes may be observed from scenic byways (Highways 93, 6, and 50) over long viewing periods.	Changes on approximately 10,681 acres due to removal of shrub vegetation in ROWs. These changes may be observed from scenic byways (Highways 93, 6, and 50) over long viewing periods.	Removal of 8,828 to 12,288 acres of vegetation, and the addition of 306 miles of new power line would result in irretrievable visual effects (increase in contrasts in color, line, and form within the landscape). These contrasts would be reduced through successful reclamation procedures. Irreversible and irretrievable landscape changes would result from installation of permanent aboveground structures that may be viewed from areas of high public use, such as scenic by-ways (portions of U.S. 93 and U.S. 50).
	Project aboveground facility lighting sources would be seen, but would not attract attention, at an intensity less than the typical effects of a single family residence.	Project aboveground facility lighting sources would be seen, but would not attract attention, at an intensity less than the typical effects of a single family residence.	Project aboveground facility lighting sources would be seen, but would not attract attention, at an intensity less than the typical effects of a single family residence.	

Table 4-1 Irreversible and Irretrievable Impacts Associated with Surface Disturbance Impacts of the Proposed GWD Project - ROW and Ancillary Facilities (Continued)

Resource	ROW and Ancillary Facilities			Irreversible and Irretrievable Commitment of Resources
	Proposed Action and Alternatives A, B, and C	Alternative D	Alternatives E and F	
Visual (Continued)	Evidence of landscape appearance changes from project facilities in Spring and Snake Valleys may be seen from higher elevation viewpoints in Great Basin National Park over distances of 5 to 10 miles. These changes are not expected to meet the intent of National Park Service scenery management objectives.	Project facilities would not be seen by visitors from Great Basin National Park from higher elevation viewpoints across Spring and Snake Valleys.	Evidence of landscape appearance changes from project facilities in Spring Valley may be seen from higher elevation viewpoints in Great Basin National Park over distances of 5 to 10 miles These changes are not expected to meet the intent of National Park Service scenery management objectives.	
Cultural	Potential adverse effects to National Register of Historic Places (NRHP)-sites mitigated prior to construction.	Same as the Proposed Action and Alternatives A through C; except no disturbance in White Pine County.	Same as the Proposed Action and Alternatives A through C; except no disturbance in Snake Valley.	NRHP-eligible sites that may be disturbed by construction activities would be mitigated in accordance with the Programmatic Agreement. Sites from which artifacts are excavated and removed represent an irreversible impact to cultural resources.
	Unanticipated discoveries of cultural resources would be protected by the PA.	Same as the Proposed Action and Alternatives A through C; except no disturbance in White Pine County.	Same as the Proposed Action and Alternatives A through C; except no disturbance in Snake Valley.	
	Potential illegal collection of artifacts or vandalism to cultural resources.	Same as the Proposed Action and Alternatives A through C; except no disturbance in White Pine County.	Same as the Proposed Action and Alternatives A through C; except no disturbance in Snake Valley.	

Table 4-1 Irreversible and Irretrievable Impacts Associated with Surface Disturbance Impacts of the Proposed GWD Project - ROW and Ancillary Facilities (Continued)

Resource	ROW and Ancillary Facilities			Irreversible and Irretrievable Commitment of Resources
	Proposed Action and Alternatives A, B, and C	Alternative D	Alternatives E and F	
Native American Traditional Values	How many PRCSs, including potential TCPs and sacred sites, would be adversely affected by the proposed GWD Project is currently unknown. If any PRCSs, including potential TCPs and sacred sites, are identified within proposed disturbance areas or within view of proposed aboveground facilities, impacts would be avoided. If avoidance is not feasible, measures to avoid, minimize, or mitigate effects to these properties would be proposed in compliance with federal mandates and the PA, and in consultation with interested Indian tribes. Since some of the cultural, religious, and traditional values associated with these properties cannot be fully mitigated, residual impacts to these properties most likely would occur.	Same as the Proposed Action and Alternatives A through C; except no disturbance in White Pine County.	Same as the Proposed Action and Alternatives A through C; except no disturbance in Snake Valley.	How many PRCSs, including potential TCPs and sacred sites, would be adversely affected by the proposed GWD Project is currently unknown. If any PRCSs, including potential TCPs and sacred sites, are identified within proposed disturbance areas or within view of proposed aboveground facilities, impacts would be avoided. If avoidance is not feasible, measures to avoid, minimize, or mitigate effects to these properties would be proposed in compliance with federal mandates and the PA, and in consultation with interested Indian tribes. Since some of the cultural, religious, and traditional values associated with these properties cannot be fully mitigated, residual impacts to these properties most likely would occur.

Table 4-1 Irreversible and Irretrievable Impacts Associated with Surface Disturbance Impacts of the Proposed GWD Project - ROW and Ancillary Facilities (Continued)

Resource	ROW and Ancillary Facilities			Irreversible and Irretrievable Commitment of Resources
	Proposed Action and Alternatives A, B, and C	Alternative D	Alternatives E and F	
Socioeconomics	Construction workers would increase demand for temporary housing and public services, generate short-term increases in revenues for local governments and private sector establishments, and result in pressures on local government budgets to accommodate the increased service demand.	Same as the Proposed Action and Alternatives A through C except for shorter duration and less demand mainly in White Pine County.	Same as the Proposed Action and Alternatives A through C except for shorter duration and less demand mainly in Snake Valley.	Development of the GWD Project would require the commitment of non-renewable and renewable resources to meet the housing, transportation, food, clothing and other needs of the construction work force and incremental needs for residents of communities affected by construction. Most of the non-monetary resource investments would be irretrievable, and their use may preclude or foreclose other use options or opportunities. The extent to which the GWD Project results in an incrementally greater commitment of resources than that associated with meeting comparable needs if the workers were located elsewhere is unclear.
Public Safety	Potential spills or leaks from use of hazardous materials mostly consisting of fuels and lubricants during construction and operation.	Same as the Proposed Action and Alternatives A through C.	Same as the Proposed Action and Alternatives A through C.	If a hazardous material spill were to occur and affect a sensitive resource, an irretrievable impact could occur pending the recovery of the affected resource.
	Aboveground facilities (pumping stations) would generate noise from water pumps. All noise-sensitive equipment and facilities would be located more than a mile from pumping stations, and noise would be less than a commonly accepted residential standard (55 A-weighted decibel).	All noise sensitive locations would be located more than a mile from pumping stations, and noise would be less than a commonly accepted residential noise standard (55 A-weighted decibel).	All noise sensitive locations would be located more than a mile from pumping stations, and noise would be less than a commonly accepted residential noise standard (55 A-weighted decibel).	
Environmental Justice	Construction activities for the main conveyance system would occur primarily in uninhabited or sparsely populated areas and no lands that are part of an Indian Reservation would be affected.	Same as the Proposed Action and Alternatives A through C except for shorter duration and shorter length of corridor in White Pine County.	Same as the Proposed Action and Alternatives A through C except for shorter duration and no corridor in Snake Valley.	Proposed project facility construction would not disproportionately affect minority or low-income populations, and therefore no irreversible nor irretrievable effects are anticipated.

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Table 4-2 Potential Irreversible and Irretrievable Commitment of Resources for the Proposed GWD Project – Groundwater Pumping (Full Build Out Plus 200 Years)[1]

Resource	Potential Impacts	Indicator Description	Alternatives							Potential Irreversible and Irretrievable Commitment of Resources
			Proposed Action	A	B	C	D	E	F	
Air	Fugitive dust from a decrease in vegetation cover and density.	PM_{10} emissions (tons per year) from windblown dust compared to no action conditions	17,840	13,327	15,955	6,690	8,252	8,563	11,608	There is a risk that there would be a long-term increase in fugitive dust from pumping basins where pumping drawdown may result in a decrease in vegetation cover and density. These potential air quality changes may limit future options for resource development. This effect would be an irretrievable commitment of air quality. Due to the long-term effects on vegetation, air quality changes in fugitive dust could be irreversible.
Geology/ Paleontology	Surface subsidence	Square miles of high ground surface subsidence risk	525	159	669	1	269	153	242	Subsidence induced by groundwater pumping exceeding 5 feet would be considered both an irreversible and irretrievable land surface modification.
Water	Flow reductions or loss of perennial waterbodies, aquifers, and other groundwater sources.	Number of inventoried springs with moderate to high risk of flow reductions	57	46	78	26	31	30	41	Long-term flow reductions or drying up of perennial springs and streams would limit future options for these surface water resources and therefore would be considered an irreversible impact. The permanent extraction of groundwater in storage within the aquifers (as evidenced by the formation of regionally extensive drawdown cones) is considered an irretrievable commitment of water resources.
		Miles of perennial streams with moderate to high risks of flow reductions	112	81	120	59	48	23	46	
		Number of surface water rights with moderate to high risks of effects	212	151	186	98	56	94	132	
		Total groundwater rights (>10 feet of drawdown)	264	223	301	171	213	110	131	

Table 4-3 Potential Irreversible and Irretrievable Commitment of Resources for the Proposed GWD Project – Groundwater Pumping (Full Build Out Plus 200 Years)[1]

Resource	Impacts	Indicator Description	Alternatives							Irreversible and Irretrievable Commitment of Resources
			Proposed Action	A	B	C	D	E	F	
Water (Continued)		Percent reduction in spring valley groundwater discharge to ET	84	57	73	37	28	56	80	
		Percent reduction in snake valley groundwater discharge to ET	33	27	24	17	8	3	3	
		Percent reduction in great salt lake desert flow system groundwater discharge to ET	54	39	44	25	16	24	34	
Soils	Reduction in water sources for hydric soil sustainability	Acres of hydric soils within high and moderate risk zones in drawdown areas (>10 feet)	20,077	11,924	12,005	2,995	6,377	9,696	8,403	Groundwater drawdown would reduce the source of water that sustains hydric soils on a long-term basis, which would be an irretrievable and potential irreversible commitment of soil resources.

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Table 4-4 Potential Irreversible and Irretrievable Commitment of Resources for the Proposed GWD Project – Groundwater Pumping (Full Build Out Plus 200 Years)[1]

Resource	Impacts	Indicator Description	Alternatives							Irreversible and Irretrievable Commitment of Resources
			Proposed Action	A	B	C	D	E	F	
Vegetation	Reduction in or composition of vegetation with loss or alteration of wetlands and wet meadows	Acres of wetland/meadows with composition and growth effects	8,048	6,137	9,190	3,250	4,453	3,835	5,519	The long-term reduction or compositional change in wetland/wet meadow and phreatophytic shrub/medium vegetation cover types, and vegetation associated with springs and streams would be an irretrievable loss of vegetation. Whether these changes in vegetation communities are irreversible would depend on whether these communities would be so altered that they could never return to their former composition, if groundwater levels are restored. Because of the very long time frames, and potential vegetation community changes over large geographic areas, the effects are considered irreversible within any reasonable time frame (likely more than 500 years).
		Acres of basin shrublands with composition and growth effects	191,506	123,714	146,998	50,076	81,349	81,389	130,591	
Wildlife	Changes to or reduction of habitat, surface water, springs and water quality leading to reductions in breeding and foraging areas	Number of important bird areas with springs or perennial streams with moderate or high risk of flow reductions	4	2	4	2	1	0	2	The loss of perennial surface water for wildlife would be an irretrievable commitment of resources. The loss or long-term reduction or degraded quality of wetland and phreatophytic shrub vegetation would be an irretrievable commitment of resources. This reduction or adverse change in habitat quality could affect habitat carrying capacity, cover, breeding sites, foraging areas, and animal displacement on a long-term basis, resulting in an irretrievable impact.
		See water and vegetation indicators and alternatives impacts for pumping effects on wildlife habitats	See Water and Vegetation	See Water and Vegetation	See Water and Vegetation	See Water and Vegetation	See Water and Vegetation	See Water and Vegetation	See Water and Vegetation	

Table 4-5 Potential Irreversible and Irretrievable Commitment of Resources for the Proposed GWD Project – Groundwater Pumping (Full Build Out Plus 200 Years)[1]

Resource	Impacts	Indicator Description	Alternatives							Irreversible and Irretrievable Commitment of Resources
			Proposed Action	A	B	C	D	E	F	
Aquatic Biological Resources	Loss/reduction in aquatic habitat due the reduced spring and stream flows and effects on aquatic species	Number of perennial streams with game fish and speeial status species with moderatc to high risk of flow reductions	31	19	24	13	10	15	25	The loss of aquatic habitat and species in perennial springs and streams from groundwater drawdown would be an irretrievable and potentially irreversible impaet for aquatic species, if waterbodies dry up or have substantial water level or flow reductions on a long-term basis.
		Miles of perennial streams with game fish and special status species with moderate to high risk of flow reductions	75	58	72	43	29	13	28	
		Number of springs/ponds/ lakes with fish, amphibian, and springsnails with moderatc or high risk of flow reductions	30	28	33	20	13	14	18	
Land Use	Reduction or loss of land vegetation quality for public and/or agricultural use	Acres of private agricultural land (>10 feet of drawdown)	17,203	15,021	17,522	13,749	7,320	3,791	4,857	Groundwater drawdown would result in groundwater level reductions that could adversely affect surface water and vegetation on public lands available for disposal and private agricultural lands. These effeets would be an irretrievable and potentially irreversible commitment of water sources for recreational use.

Table 4-6 Potential Irreversible and Irretrievable Commitment of Resources for the Proposed GWD Project – Groundwater Pumping (Full Build Out Plus 200 Years)[1]

Resource	Impacts	Indicator Description	Alternatives							Irreversible and Irretrievable Commitment of Resources
			Proposed Action	A	B	C	D	E	F	
Recreation	Reduction or loss of land, wetland and stream vegetation quality/type and therefore, recreation options	Number of springs with moderate or high risk of flow reductions	23	19	53	12	11	8	12	The long-term reductions or compositional change in wetland/wet meadow and phreatophytic shrubland vegetation cover types, and vegetation associated with springs and streams would be an irretrievable loss of vegetation (see Vegetation). Long-term flow reductions or drying up of perennial springs and streams would limit future options for these surface water resources and therefore would be considered an irreversible impact to recreation users.
		Miles of game fish streams with risk of flow reductions in recreation areas	14	12	28	10	8	2	4	
Rangeland	Loss or reduction in allotments available for livestock grazing due to loss of waterbodies and/or loss/reduction in spring and stream flows and associated vegetation	Number of perennial springs within grazing allotments with moderate to high risk of flow reductions	303	180	259	94	121	104	203	Reductions to flow or quality of springs and perennial streams would be both an irretrievable and potentially irreversible loss of water sources for livestock.
		Miles of perennial streams within grazing allotments with moderate to high risk of flow reductions	102	72	105	50	39	20	41	
		Acres of phreatophytic vegetation and wet meadow vegetation in grazing allotments	200,080	130,378	156,713	53,799	85,811	87,224	136,110	

Table 4-7 Potential Irreversible and Irretrievable Commitment of Resources for the Proposed GWD Project – Groundwater Pumping (Full Build Out Plus 200 Years)[1]

Resource	Impacts	Indicator Description	Alternatives							Irreversible and Irretrievable Commitment of Resources
			Proposed Action	A	B	C	D	E	F	
Wild Horses	Loss or reduction in water sources and forage available as a result of loss or reduction in vegetation (correlated with waterbodies and/or loss/reduction in spring and stream flows)	Number of springs within HMAs with moderate to high risk of flow reductions	14	5	9	2	27	5	11	Reductions to flow or quality of springs and perennial streams would be both an irretrievable and potentially an irreversible loss of water sources for wild horses.
		Acres of phreatophytic vegetation and wet meadow vegetation in HMAs	2,511	0	2,511	0	2,511	0	1,266	
Special Designations	Changes or reduction in wetland/wet meadow and shrubland vegetation and therefore a reduction in areas and appearance of special designation	Number of special designation areas with phreatophytic vegetation	5	3	5	3	2	3	4	The long-term reductions or compositional change in wetland/wet meadow and phreatophytic shrubland vegetation cover types, and vegetation associated with springs and streams would be irretrievable within the modeled pumping timeframes (see Vegetation). Long-term flow reductions or drying up of perennial springs and streams would limit future options for these surface water resources and therefore would be considered an irreversible impact affecting the special designations and the management direction for them.
		Acres of phreatophytic vegetation in special designations areas	14,032	12,635	14,032	6,673	10,407	12,408	13,954	

Table 4-8 Potential Irreversible and Irretrievable Commitment of Resources for the Proposed GWD Project – Groundwater Pumping (Full Build Out Plus 200 Years)[1]

Resource	Impacts	Indicator Description	Alternatives							Irreversible and Irretrievable Commitment of Resources
			Proposed Action	A	B	C	D	E	F	
Visual	Alteration of landscape views due to loss/reduction or change in vegetation, wetlands and waterbodies	Acres of wetland or wet meadows with appearance change due to potential composition and growth effects	8,048	6,137	9,190	3,250	4,453	3,835	5,519	Future groundwater drawdown would gradually alter landscape views in areas where wetland, wet meadow, and basin shruland vegetation composition and structure are changed on a long-term basis. These changes would be irretrievable and may be irreversible, if water sources are not replaced.
		Acres of basin shrublands with appearance change due to potential composition and growth effects	191,506	123,714	146,998	50,076	81,349	81,389	130,591	
Native American Traditional Values	Drawdown effects on water and biological resources with traditional and religious values	See water, vegetation, wildlife and aquatic biology indicators and alternatives impacts for pumping effects on native American traditional values	See Water, Vegetation, Wildlife and Aquatic Biology	See Water, Vegetation, Wildlife and Aquatic Biology	See Water, Vegetation, Wildlife and Aquatic Biology	See Water, Vegetation, Wildlife and Aquatic Biology	See Water, Vegetation, Wildlife and Aquatic Biology	See Water, Vegetation, Wildlife and Aquatic Biology	See Water, Vegetation, Wildlife and Aquatic Biology	The traditional, cultural, and religious experience may be diminished in areas where surface water, vegetation, wildlife, or fish resources are affected by drawdown. This reduction may be both irretrievable and irreversible, depending on the extent of surface water or vegetation resource changes (see Water Resources, Vegetation, Wildlife, and Aquatic Biological Resource sections) and the timeframe associated with groundwater recovery.

Table 4-9 Potential Irreversible and Irretrievable Commitment of Resources for the Proposed GWD Project – Groundwater Pumping (Full Build Out Plus 200 Years)[1]

Resource	Impacts	Indicator Description	Alternatives							Irreversible and Irretrievable Commitment of Resources
			Proposed Action	A	B	C	D	E	F	
Socioeconomics	Effects on agriculture (irrigation costs and grazing), potential economic effects related to tourism, recreation, and economic development, and social impacts to rural communities and lifestyle	Acres of private agricultural land in Spring and Snake valleys (drawdown ≥ 10 Feet)	17,192	15,021	14,844	13,749	4,612	3,791	3,618	Groundwater pumping over the long term (50 to 200 years) would increase irrigation pumping costs (electricity), could reduce grazing and total agricultural production, and adversely affect viability of farming and ranching. Long-term reduction in farm population would affect social structure of the rural areas. These additional costs, reductions in production, and social effects are considered to be both irreversible and irretrievable because of the long timeframes, and the uncertainty that groundwater levels would recover to former elevations at cessation of pumping.
		Acres of private agricultural land in Spring and Snake valleys (drawdown of ≥ 50 Feet)	13,439	11,592	13,224	0	198	2,916	3.030	
		Acres of public lands in the Ely District identified for potential disposal	5,399	4,926	7,255	4,926	915	107	107	
		Adverse economic and social impacts in rural areas due to uncertainty and risks	Yes	Yes	Yes	Yes	Yes (reduced compared to the Proposed Action and Alternatives A through C)	Yes (reduced compared to the Proposed Action and Alternatives A through C)	Yes (reduced compared to the Proposed Action and Alternatives A through C)	

[1] No pumping effects would occur for transportation, cultural resources, and public safety, since there is no connection to surface water or affected vegetation.

5. Consultation and Coordination

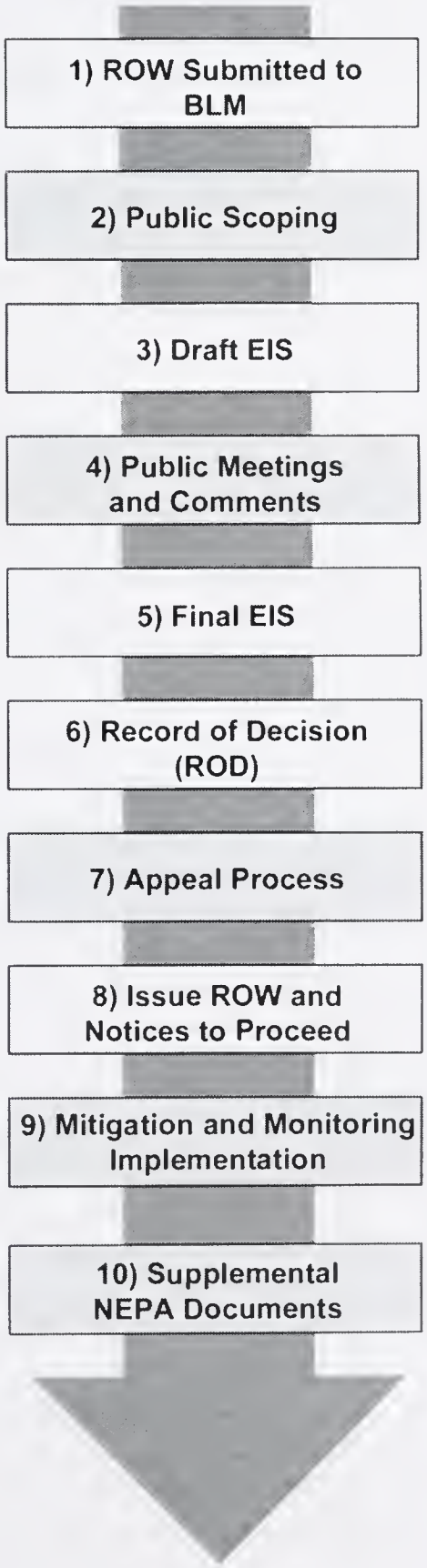
5.1 Introduction

This chapter provides a summary of the opportunities that have been made available for public involvement, including government, and non-governmental agencies or organization on the GWD project.

A flow chart of a typical NEPA process for creation of an EIS is shown in the figure in the sidebar. Places in the process where public involvement typically occurs are identified on the graphic (as colored boxes).

The public participation program for the Clark, Lincoln, and White Pine counties Groundwater Development Project helped to determine the scope of issues to be addressed in the EIS. Further discussion of issues brought forward in scoping is provided in Section 5.2.

Initially, mailing lists were requested from agencies and other entities with projects or interests in the area and a postcard was sent to determine if the recipient had an interest in remaining on the mailing list for this project. The initial mailing was sent to approximately 2,000 addresses. Subsequent mailings included those who expressed an interest and others who requested that their name be added to the mailing list. Addresses were removed if a submission was returned as undeliverable. When returned with an address update, the new information was added to the database for subsequent mailings.



5.2 Scoping

The BLM initiated the scoping process by publishing a Notice of Intent (NOI) to prepare an EIS in the Federal Register (FR) on April 8, 2005. Public meetings were held in the communities and on the dates included in **Table 5.2-1.** A second NOI was published on July 19, 2006, notifying the public and interested government agencies of changes to the proposed project. This second NOI also invited the public to comment on the project and project changes by reopening the scoping period. All comments (written and oral) were summarized for inclusion in the Scoping Summary Report and issues were distilled for use in writing the EIS. The analysis of the pertinent issues will provide the BLM decision makers with appropriate information to make a determination of whether the ROW should be granted.

Table 5.2-1 Summary of Public Scoping Meetings

Meeting Location	Dates	Signed-in Participants	Speakers
Bristleeone Convention Center, Ely, Nevada	Tuesday, April 26, 2005	131	30
Baker School Gymnasium, Baker Nevada	Wednesday, April 27, 2005	138	49
Caliente Youth Center, Caliente, Nevada	Thursday, April 28, 2005	30	8
Ambulanee Barn, Alamo, Nevada	Tuesday, May 3, 2005	14	5
Alexis Park, Las Vegas, Nevada	Wednesday, May 4, 2005	112	29
Airport Plaza, Reno, Nevada	Thursday, May 5, 2005	70	24
Plaza Hotel, Salt Lake City, Utah	Monday, May 9, 2005	60	20
Crystal Inn Hotel, Cedar City, Utah	Tuesday, May 10, 2005	39	9
Fair Building, Delta, Utah	Wednesday, May 11, 2005	63	36

5.3 Public Outreach

The BLM has initiated extensive interaction with the public following the publishing of the Notice of Intent (NOI) in the Federal Register on April 5, 2005. Summaries of the interaction with Cooperating Agencies, Technical Task Groups, and Tribal entities are presented in Sections 5.3-1 through 5.3-3. In addition to those specific collaborations, the BLM has conducted extensive outreach and has actively pursued opportunities to inform the public of the status of the project, respond to questions and concerns, and provided a forum for public input. A Public Participation Matrix has been compiled to document the breadth of interaction with the public. The matrix is presented in Appendix G.

On June 10, 2011 a Notice of Availability was published in the Federal Register (76[112]:34097-34099) announcing the availability of the Draft EIS for a 90 day public review and comment period running from June 10 through September 9, 2011. The comment period was extended by 30 days and terminated on October 11, 2011. Following the release of the Draft EIS the BLM hosted a series of public hearing meetings in August of 2011 to answer questions and gather comments pertaining to the DEIS. Seven public meetings were held in Nevada and two in Utah (see **Table 5.3-1)**. All meetings started as open house with technical specialists available to answer questions. A formal hearing with a facilitator and court reporter then followed to coordinate and document all discussions. Written comments were also received throughout the 90 day comment period via mail, fax, and email.

Table 5.3-1 Public Meetings on the Draft EIS

Meeting Location	Date	Signed-in Participants	Speakers	Source of Public Notification
Pioehe Elementary School, Pioehe, Nevada	Tuesday, August 2, 2011	34	13	Ely Times and Las Vegas Review Journal
Baker Elementary School Annex, Baker, Nevada	Wednesday, August 3, 2011	73	15	Ely Times and Las Vegas Review Journal
Delta High School, Delta, Utah	Thursday, August 4, 2011	24	6	Millard County Chroniele Progress
White Pine High School, Ely, Nevada	Tuesday, August 9, 2011	44	13	Ely Times
Red Lion Hotel, Elko, Nevada	Wednesday, August 10, 2011	35	13	Elko Daily Free Press
Hampton Inn & Suites, Salt Lake City, Utah	Thursday, August 11, 2011	50	19	The Salt Lake Tribune and Deseret News
Henderson Convention Center, Henderson, Nevada	Monday, August 15, 2011	129	30	Las Vegas Review Journal and Lineoln County Reeorder
Lineoln County Alamo Annex, Alamo, Nevada	Tuesday, August 16, 2011	16	9	Lineoln County Reeorder and Las Vegas Review Journal
Sparks High School, Sparks, Nevada	Friday, August 18, 2011	54	19	Reno Gazette Journal

5.3.1 Cooperating Agencies

In the early stages of the project, the BLM sent out 30 letters inviting the participation of federal and state agencies, local governments, and other organizations as official cooperating agencies. According to 40 CFR 1501.6, cooperating agencies have a four-part role in the EIS process: 1) participate in the NEPA process at the earliest available time period; 2) participate in scoping; 3) at the lead agency's request, assume responsibility for developing information and preparing environmental analyses for areas in which the cooperating agency has special expertise, and 4) at the lead agency's request, make staff available to support the EIS process. A Memorandum of Understanding (MOU) was created to establish guidelines for the parties that desired to become formal cooperating agencies. Sixteen agencies, governments, and other organizations have formalized their participation as a cooperating agency by signing MOUs (see Section 6.3).

5.3.2 Tribal Interaction

Interaction with the Tribes in the area also has been a top priority and the BLM has met numerous times with tribal governments, individual tribal members and tribal groups. Government-to-government interaction is ongoing through the Section 106 process. In addition, an Ethnographic Assessment has been completed to document specific tribal concerns and identify geographic areas that the tribes believe should be protected to preserve their traditional historic and cultural values, see Section 3.17, Native American Traditional Values.

Following the publication of the Notice of Availability in the Federal Register (see Section 5.3), the BLM hosted a series of tribal meetings in August of 2011 to answer questions and gather comments on the DEIS. Three meetings were held in Nevada and two in Utah (see **Table 5.3-2**). A facilitator and court reporter were present at all meetings to coordinate and document all discussions. Written comments were also received throughout the 120 day comment period via mail, fax, and email.

Table 5.3-2 Tribal Meetings on the Draft EIS

Meeting Location	Date	Signed-in Participants	Speakers
Moapa Band of Paiutes Tribal Headquarters, Moapa, Nevada	Monday, August 1, 2011	3	1
Goshute Reservation Tribal Headquarters, Ibapah, Utah	Monday, August 8, 2011	19	5
Ely Shoshone Tribal Headquarters, Ely, Nevada	Tuesday, August 9, 2011	10	4
Te-Moak Tribal Headquarters, Elko, Nevada	Wednesday, August 10, 2011	6	1
Paiute Indian Tribe of Utah Tribal Headquarters, Cedar City, Utah	Thursday, August 17, 2011	10	1

5.3.3 Technical Work Groups

Technical work groups were established early in the EIS process to help to solicit input on important, far-reaching topics

including natural resources, hydrology, and socioeconomics. The work groups met on a regular basis and provided specialized knowledge on the topic of interest. In the case of the Natural Resources Group, a technical report was completed to characterize the species and habitat in the area of interest. The hydrology technical task team met frequently as the model was being developed and their input provided a framework for the model's structure and its analytical results. Outside experts from academia and the USGS also were involved. A hydrology baseline report was produced and distributed for review. Additional details on the work group process are provided in Sections 3.3, Water Resources; 3.5, Vegetation; and 3.18, Socioeconomics.

5.3.4 Summary of Draft EIS Comments

The following list contains a synopsis of frequent comment topics submitted to the BLM following the public review of the Draft EIS. This list is not intended to be all-inclusive; it is presented here to help the reader understand the general nature of the comments received. The list below is organized into topical areas – please note that only the overarching themes are presented in this list even though comments on different resources received comments with overlapping concerns (e.g., the 10-foot drawdown, vegetation changes, monitoring and mitigation). Specific responses to all comments

are provided in **Appendix H** of this FEIS and appropriate changes have been made to the EIS to reflect the input from the public. Most of the changes are marked with a text bar in the margin of the Final EIS.

General

- Requests for comment period extension
- Requests or concerns surrounding the selection of alternatives
- Insufficient range of alternatives
- Requests for analysis, or concerns related to the lack of analysis of other water supply options
- Questions regarding the selection of the Agency Preferred Alternative
- Questions/concerns regarding the use of a programmatic analysis and subsequent tiering under NEPA
- Nonconformance with BLM RMPs
- Statements of support/opposition to the project reflecting broad public policy issues including:

  1) allocation of groundwater resources in Nevada;

  2) potential implications of inter-basin water transfers;

  3) calls for greater conservation prior to inter-basin transfers of water; and

  4) the reservation and prioritization of ground and surface water rights for recreation, wildlife and other uses.

Air Quality and Climate Change

- Dust from surface disturbance or groundwater drawdown and the potential impacts on human health, effects on visibility (especially related to Great Basin National Park).
- Dust contribution to NAAQS non-attainment areas including the Utah/Wasatch Front and Clark County, Nevada.
- Concerns related to development methodologies for air quality emissions
- Requests for Air Quality modeling
- Effects of Climate Change on the area and the cumulative effects of the potential groundwater drawdown and climate change.

Geology

- Questions and concerns related to subsidence

Water Resources

- Concern that the predicted water use and modeled drawdown under the No Action Alternative is exaggerated.
- Concerns pertaining to the use of the regional scale numerical groundwater flow model and model simulated 10-foot drawdown contour to define the drawdown area for the impact analysis;
- Concerns with the use of model simulated changes to flow in selected springs and streams to identify potential impacts
- Concerns related to the criteria for selection of the groundwater flow model area
- Concerns related to timeframes used for the programmatic analysis
- Questions related to the representation of faults in the groundwater flow model
- Mitigation and monitoring concerns including the selection of monitoring locations

Biological Resources

- Concerns related to the potential reduction of vegetation; particularly wetlands/meadows and white sage (winterfat)
- Concerns related to vegetation re-establishment and successful treatment/prevention of annual invasive weed species in areas of disturbance
- Concerns regarding raptors, migratory birds, and bats
- New policies (e.g., greater sage-grouse, southwestern willow flycatcher revised proposed critical habitat)
- Concerns regarding potential pumping effects on special status species and their habitat in Utah hydrologic basins
- Concerns regarding the risks and relatively large predicted flow reductions in some springs in Spring and Snake valleys and potential effects on special status aquatic species

Human Resources

- Visual resources concerns related to project components and desertification – particularly related to the viewshed from Great Basin National Park
- Concerns related to recreation and tourism including loss of visitation to the GBNP, loss or population decline of game species, and loss of hunting and fishing habitat
- Native American concerns related to loss of historic lands, TCPs, artifacts, plants and animals of cultural importance, and the loss of water which many tribes hold sacred
- Inadequate tribal consultation
- Questions and concerns related to cost of the project and financing plans
- Questions regarding current economic conditions or projected growth in the Las Vegas Valley and SNWA's "need" for additional water supply
- Potential adverse effects or benefits that would accrue in Clark County if the project does not, or conversely, does move forward
- Perception that the project could foreclose future economic development opportunities in White Pine County and the Utah portion of the Snake Valley
- Socioeconomic impacts related to the loss of water and vegetation on critical winter grazing allotments and wild horse management areas

Cumulative Impacts

- Concerns related to the choice of projects (basis for choice for both surface and groundwater drawdown-related projects) that were included/excluded and the process for conducting the cumulative impact analysi

Mitigation and Monitoring

- Requests for additional specificity in the mitigation and monitoring plans (including the stipulation agreements)
- Concerns related to effectiveness of monitoring and mitigation
- Concern regarding the identification of impact thresholds for implementing mitigation
- Concern that the pumps would not be turned off even if effects are identified in the future
- Concerns related to assurances of long-term monitoring and mitigation
- Concerns related to monitoring and mitigation implication on project development and operating costs

Table 5.3-3 shows a tally of comment letters by affiliation type received during the 120 day comment period for the Draft EIS.

Table 5.3-3 Number of Commentors by Affiliation

Affiliation Type	Number of Comment Letters
Business	68
Federal Agencies	4
Individuals	294
Local Government	17
NGO's	28
State Agencies	14
Tribal Government	10
Tribal Individuals	26
Total	**461**

5.4 Mailings

5.4.1 Postcards

5.4.1.1 Project Initiation

Postcards were mailed to over 8,000 entities to inquire if they wanted to continue to receive project information. Those who returned the postcard and indicated that they wanted to continue to receive information were retained on the project mailing list.

5.4.1.2 Form Letters Received on the Draft EIS

Over 20,000 form letters were received from the Center for Biological Diversity in response to the Draft EIS. Of these, 814 contained unique text but not substantive comments. Postcards have been mailed to all verifiable addresses announcing the availability of the Final EIS and providing information on downloading or obtaining a copy.

5.4.2 Newsletters

To date, nine newsletters have been mailed to the addresses on the project mailing list. The newsletters are available at www.blm.gov/5w5c. The newsletters were developed to inform and educate interested parties about project elements, government and agency responsibilities, the NEPA process, and other topics of interest. Project progress and a schedule of key deliverables also were communicated.

5.5 List of Involved Agencies, Entities, or Individuals

5.5.1 Federal Agencies

- National Park Service (NPS)
- Bureau of Indian Affairs (BIA)
- Bureau of Reclamation (BOR)
- Nellis Air Force Base
- U.S. Forest Service (USFS)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Army Corps of Engineers (USACE)
- U.S. Environmental Protection Agency (USEPA)
- Federal Highway Administration (FHA)
- U.S. Geological Survey (USGS)

5.5.2 State Agencies

- Nevada Division of Environmental Protection (NDEP), Bureau of Water Pollution Control
- NDEP, Bureau of Safe Drinking Water
- Nevada Department of Transportation (NDOT)
- Nevada Department of Water Resources (NDWR)
- Nevada Department of Wildlife (NDOW)
- Nevada Division of Forestry
- Nevada Department of Cultural Affairs, State Historic Preservation Office (SHPO)
- Public Utility Commission of Nevada
- Utah Geological Survey
- Utah Division of Wildlife Resources
- Utah Division of Water Rights
- Utah Division of Air Quality
- Utah Department of Natural Resources
- State of Utah, Governor's Office

5.5.3 Local Agencies

- Clark County, NV
- Lincoln County, NV
- White Pine County , NV
- Tooele County, UT
- Juab County, UT
- Millard County, UT

- Central Nevada Regional Water Authority
- Utah Association of Counties

5.5.4 Tribal Governments

- Confederated Tribes of Goshute Reservation
- Duck Valley Shoshone-Paiute Tribe
- Duckwater Shoshone Tribe
- Ely Shoshone Tribe
- Te-Moak Tribe
  - Battle Mountain Band
  - Elko Band
  - South Fork Band
  - Wells Band
- Timbisha Shoshone Tribe
- Yomba Shoshone Tribe
- Chemehuevi Indian Tribe
- Colorado River Indian Tribes
- Fort Mojave Indian Tribe
- Hualapai Tribe
- Kaibab Paiute Tribe
- Las Vegas Paiute Tribe
- Moapa Band of Paiutes
- Pahrump Paiute Tribe
- Paiute Indian Tribe of Utah
  - Cedar Band of Paiute Indians
  - Indian Peaks Band of Paiute Indians
  - Kanosh Band of Paiute Indians
  - Koosharem Band of Paiute Indians
  - Shivwits Band of Paiute Indians

5.5.5 Other Organizations and Individuals

Approximately 1,600 other involved organizations and individuals are contacted periodically through the mailing of newsletters and other correspondence. The mailing list is updated on an ongoing basis and is a component of the project administrative record.

5.6 List of Agencies, Organizations, and Individuals to Whom Copies of this Statement are Sent

5.6.1 Federal and State Officials

Utah Governor – Herbert, Gary R
Nevada Lt. Governor – Krolicki, Brian
U.S. Senator – Hatch, Orrin
U.S. Senator – Heller, Dean
U.S. Senator – Lee, Mike
U.S. Senator – Reid, Harry
U.S. Congresswoman – Berkley, Shelley
U.S. Congressman – Bishop, Rob
U.S. Congressman – Chaffetz, Jason
U.S. Congressman – Heck, Joe
U.S. Congressman – Matheson, Jim
Nevada Assemblyman – Aizley, Paul
Nevada Assemblyman – Anderson, Elliot
Nevada Assemblyman – Atkinson, Kelvin
Nevada Assemblywoman – Benitez-Thompson, Teresa
Nevada Assemblyman – Brooks, Steven
Nevada Assemblywoman – Bustamante Adams, Irene
Nevada Assemblywoman – Carlton, Maggie
Nevada Assemblyman – Carrillo, Richard
Nevada Assemblyman – Conklin, Marcus
Nevada Assemblyman – Daly, Richard "Skip"
Nevada Assemblywoman – Diaz, Olivia
Nevada Assemblywoman – Dondero Loop, Marilyn
Nevada Assemblyman – Ellison, John
Nevada Assemblywoman – Flores, Lucy
Nevada Assemblyman – Goedhart, Ed
Nevada Assemblyman – Goicoechea, Peter
Nevada Assemblyman – Hambrick, John
Nevada Assemblyman – Hardy, Cresent
Nevada Assemblyman – Hogan, Joseph
Nevada Assemblyman – Horne, William
Nevada Assemblywoman – Kirkpatrick, Marilyn
Nevada Assemblywoman – Mastroluca, April
Nevada Assemblyman – Mcarthur, Richard
Nevada Assemblyman – Munford, Harvey
Nevada Assemblyman – Neal, Dina
Nevada Assemblyman – Oceguera, John
Nevada Assemblyman – Ohrenschall, James
Nevada Assemblywoman – Pierce, Peggy
Nevada Assemblyman – Segerblom, Tick
Nevada Assemblyman – Sherwood, Mark
Nevada Assemblyman – Stewart, Lynn
Nevada Assemblywoman – Woodbury, Melissa
Nevada Senator – Breeden, Shirley
Nevada Senator – Cegavske, Barbra
Nevada Senator – Copening, Allison
Nevada Senator – Denis, Mo
Nevada Senator – Gustavson, Don
Nevada Senator – Halseth, Elizabeth
Nevada Senator – Hardy M.D., Joseph (Joe)
Nevada Senator – Horsford, Steven
Nevada Senator – Kihuen, Ruben
Nevada Senator – Lee, John
Nevada Senator – Manendo, Mark
Nevada Senator – McGinness, Mike
Nevada Senator – Parks, David R
Nevada Senator – Rhoads, Dean
Nevada Senator – Schneider, Mike
Nevada Senator – Wiener, Valerie
Utah Representative – Duckworth, Susan
Utah Representative – Noel, Michael
Utah Representative – Rudd Menlove, Ronda
Utah Representative – Sagers, Douglas
Utah Representative – Sumsion, Kenneth
Utah Representative – Vickers, Evan
Utah Representative – Wright, Bill
Utah Senator – Knudson, Peter
Utah Senator – Madsen, Mark B
Utah Senator – Mayne, Karen
Utah Senator – Okerlund, Ralph
Utah Senator – Robles, Luz
Utah Senator – Thatcher, Daniel W
Utah Senator – Urquhart, Stephen
Utah Senator – Waddoups, Michael

5.6.2 Federal Agencies

Bureau of Indian Affairs, Phoenix, AZ
Bureau of Indian Affairs, St George, UT
Bureau of Indian Affairs, Elko, NV
Bureau of Land Management, Battle Mountain, NV
Bureau of Land Management, Caliente, NV
Bureau of Land Management, Cedar City, UT
Bureau of Land Management, Elko, NV
Bureau of Land Management, Ely, NV
Bureau of Land Management, Fillmore, UT
Bureau of Land Management, Kanab, UT
Bureau of Land Management, Lakewood, CO
Bureau of Land Management, Las Vegas, NV
Bureau of Land Management, Moab, UT
Bureau of Land Management, Reno, NV
Bureau of Land Management, Richfield, UT
Bureau of Land Management, Salt Lake City, UT
Bureau of Land Management, St George, UT
Bureau of Land Management, Washington, DC
Bureau of Reclamation, Boulder City, NV
Bureau of Reclamation, Carson City, NV
Bureau of Reclamation, Denver, CO
Department of the Air Force, Nellis AFB, NV
Department of the Interior, Washington, DC
Hawthorne Army Depot, Hawthorne, NV
National Park Service, Baker, NV
National Park Service, Boulder City, NV
National Park Service, Denver, CO
National Park Service, Fort Collins, CO
National Park Service, Washington, DC
Natural Resource Conservation Service, Caliente, NV
Natural Resource Conservation Service, Minden, NV
U.S. Army Dugway Proving Ground, Dugway, UT
U.S. Department of Agriculture, Ely, NV
U.S. Department of Agriculture, Farm Service Agency, Fallon, NV
U.S. Department of Agriculture, Farm Service Agency, Reno, NV
U.S. Environmental Protection Agency, Las Vegas, NV
U.S. Environmental Protection Agency, San Francisco, CA
U.S. Fish and Wildlife Service, Amoragosa Valley, NV
U.S. Fish and Wildlife Service, Alamo, NV
U.S. Fish and Wildlife Service, Denver, CO
U.S. Fish and Wildlife Service, Fish Springs, UT
U.S. Fish and Wildlife Service, Las Vegas, NV
U.S. Fish and Wildlife Service, Portland, OR
U.S. Fish and Wildlife Service, Reno, NV
U.S. Fish and Wildlife Service, Ruby Valley, NV
U.S. Fish and Wildlife Service, Sacramento, CA
U.S. Fish and Wildlife Service, West Valley City, UT
U.S. Forest Service, Elko, NV
U.S. Forest Service, Ely, NV
U.S. Forest Service, Sparks, NV
U.S. Forest Service, Tonopah, NV
U.S. Forest Service, Wells, NV
U.S. Geological Survey, Carson City, NV

5.6.3 Nevada State Agencies

Colorado River Commission, Las Vegas
Cooperative Extension, Logandale
Department of Prisons, Ely
Department of Transportation, Carson City
Department of Wildlife, Ely
Department of Wildlife, Las Vegas
Department of Wildlife, Reno
Department of Wildlife, Ruby Valley
Development Authority, Las Vegas
Division of Conservation Districts, Carson City
Division of Environmental Protection, Carson City
Division of Forestry, Pioche
Division of Minerals, Carson City
Division of Minerals, Las Vegas
Division of State Parks, Logandale
Division of State Parks, Panaca
Division of Water Resources, Carson City
Natural Heritage Program, Carson City
Nevada Army National Guard, Carson City
Office of Energy, Carson City
State Clearinghouse, Carson City
State Controller, Carson City
State Historic Preservation Office, Carson City
State Museum, Carson City

5.6.4 Utah State Agencies

Division of Water Rights, Salt Lake City
Division of Water Quality, Salt Lake City
Division of Wildlife, Salt Lake City
Division of Wildlife, St George
Geological Survey, Salt Lake City
Public Lands Policy Coordination Office, Salt Lake City

5.6.5 Local Government and Agencies

Alamo Town Board, NV
Beaver County, UT
Central Nevada Regional Water Authority, NV
City of Alamo, NV
City of Ely, NV
City of Henderson, NV
City of Las Vegas, NV
City of Los Angeles, CA
City of Mesquite, NV
City of Surprise, CA
City of Wells, NV
Clark County, NV
Elko County, NV
Esmeralda County, NV
Eureka County, NV
Hawthorne Utilities, NV
Iron County, UT
Juab County, UT
Lander County, NV
Lincoln County, NV
Milford City, UT
Millard County, UT
Mineral County, NV
Nye County, NV
Salt Lake City, UT
Salt Lake County, UT
Tooele County, UT
Utah Association of Counties, UT
Utah County, UT
White Pine County, NV

5.6.6 Tribal Governments and Organizations

Aha Makav Cultural Society
Blackfeet Nation
Chemehuevi Indian Tribe
Colorado River Indian Tribal Museum
Colorado River Indian Tribes
Confederated Tribes of the Goshute Reservation
Crow Tribe - Apsaalooke Nation
Duck Valley Shoshone Paiute Tribe
Duckwater Shoshone Tribe
Eastern Shoshone Tribal Business Council
Eastern Shoshone Tribe
Ely Shoshone Tribe
Fort Mojave Indian Tribe
Hualapai Tribal Council
Inter-Tribal Council of Nevada
Kaibab Paiute Tribe
Koosharem Band of Utah Paiute Indians
Las Vegas Paiute Tribe
Moapa Band of Paiutes
Northern Arapaho Business Council
Northern Arapaho Tribe
Pahrump Paiute Tribe
Paiute Indian Tribe of Utah
- Cedar Band
- Indian Peaks Band
- Kanosh Band
- Shivwits Band

POW WOW of the Four Winds
Shoshone-Bannock Tribes
Shundahai Western Shoshone
Southern Nevada Paiute Elders Group
Southern Paiute Consortium
Te-Moak Tribe
- Battle Mountain Band
- Elko Band
- South Fork Band
- Wells Band

Timbisha Shoshone Tribe
Ute Indian Tribe
Washoe Tribe of Nevada and California
Western Shoshone Defense Council
Western Shoshone Defense Project
Western Shoshone National Council
Winnemucca Indian Colony
Yomba Shoshone Tribe

5.6.7 Other Organizations and Groups

Advocates for Community and Environment
Associated General Contractors Las Vegas
Baker Area Citizens Advisory Board
CA & NV Rockhounders
Californians for Western Wilderness
Clark County Rural Town Services
Coalition of National Park Service Retirees
Coalition for Nevada Wildlife
Colorado River Basin Salinity Control Forum
Culinary Workers Union Local 226
Defenders of Wildlife
Desert Law and Water Science Forum
Desert Research Institute
DIA Art Foundation
Ducks Unlimited
Eastern Nevada Landscape Coalition
Eureka Producers Cooperative
Friends of Arizona Rivers
Friends of Great Salt Lake
Friends of Nevada Wilderness
Great Basin Bird Observatory
Great Basin Business and Tourism Council
Great Basin National Heritage Route
Great Basin Water Network
Great Salt Lake Audubon
Great Salt Lake Keepers
Greater Las Vegas Association of Realtors
Henderson Development Association
Indian Springs Civic Association
Intl Soc Protection of Mustangs Burros
Las Vegas Convention and Visitors Authority
Latin Chamber of Commerce Nevada, Inc.
Lincoln County Farm Bureau, NV
Lincoln County Heritage Site Stewards
National Audubon Society
National Mustang Association
National Parks Conservation Association
NE NV Stewardship GRP
Nevada Archaeological Association
Nevada Board of Sheep Commissioners
Nevada Contractors Association
Nevada Environmental Coalition Inc.
Nevada Farm Bureau
Nevada Job Connect
Nevada Miners and Prospectors Association
Nevada Outdoor Recreation Association
Nevada State AFL CIO
Nevada Subcontractors Association
Nevada Water Resources Association
Nevada Wilderness Project
Nevada Wildlife Federation
Office of Public Archaeology
Operating Engineers Local #3
Partners in Conservation
Partnership for the USA
Progressive Leadership Alliance of Nevada
Public Lands Foundation
Public Resource Associates
Resource Advisory Council
Sandy Valley Public Water Preservation Association, NV
Sierra Club
Southern Nevada Home Builders Assoc
Southern Utah Land Restoration Project
Southwest Regional Council of Carpenters
The Center for Biological Diversity
The Conservation Fund
The Nature Conservancy
The Wilderness Society
Utah Cattleman's Association
Utah Farm Bureau
Utah Property Rights Association
Western Environmental Law Center
Western Lands Project
Western Resource Advocates
Western Watersheds Project
Wilderness Impact Research Foundation

5.6.8 Companies and Businesses

7H Ranch, LLC
AECOM Environment
Ameron International Water Transmission Group
Arid Lake Tree Nursery LLC
ASM Affiliates
Baker Ranches, Inc.
Barrick Gold of North America
Basin Research Associates
Bengston Consulting
BEC Environmental
Black and Veatch
BLT Lincoln County Land, LLC
Blue Diamond Oil Corp
Bobcat Properties, Inc.
Broken Tongue Land and Livestock
Butler Holdings, LLC
C/O Kleinfelder
Cardno Entrix Environmental Consultants
Carter Cattle Company
Centerra U S, Inc.
Chico Environmental Science and Planning LLC
Computa Cat Corner
Construction Notebook
D4 Enterprises
Deep Creek Mountains Ranch
Desert Wildlife
Dixie Power Water Light Telephone & Oil, Inc.
Double Horseshoe Ranch, LLC
Doug Lenier Productions
Dunbar Stone Co., Inc.
Dunseath Key Co.
Durham Resource Consulting
Eagle Exploration
Echohawk Law Offices
Egbert Livestock, LLC
Ellison Ranching Co.
Executive Home Builders, Inc.
First National Bank
Fish Creek Ranch, LLC
FM Fulstone, Inc.
Focus Property Group
FX Energy, Inc.
George Eldridge and Sons
Geotechnical & Environmental Services, Inc.
Gl Ranch
Gnomon Inc.
Godec, Randall & Assoc
Granite Construction Co.
Grassetti Environmental Consulting
Hager & Hearne
Harris Farms and Desert Utilities
HDR
Hidden Canyon Ranch
Holland and Hart
Horizon Wind Energy
Humbold Outfitters
Huntsman Ranch, LLC
ICF International
Idaho Power
Illumina Proquest
Interstate Dist Inc.
JBR Environmental Consultants Inc.
John Espil Sheep Co
John Uhalde and Company
Jones & Stokes
Kautz Environmental Consultants
KB Home Nevada Inc.
KDJ Associates
Kennedy Consulting Inc.
KOA Campgrounds
Larralde Sheep
Lewis Operating Corporation
Mark Fore and Strike
Meritage Homes of Nevada Inc.
Moltan Company
Moriah Ranches, Inc.
Mt Wheeler Power Co
Natural Resources Project Management
Nevada Bell
Nevada Land and Resource Co, LLC & Vidler Water
Northwest Pipe Co.
Olympia Land Corporation
Osceola Placer Mine
Patagonia
PBS & J
Phillips and Jordan Inc.
Placer Dome America
Quadra Mining Co.
Quantum Utility Generation
Rafter Lazy C Ranch
Resource Concepts, Inc.
Resource Land Holdings, LLC
Saga Exploration Inc.
Sammons/Dutton
Silver Jack Inn
SNEI Environmental Consultants
Snowball Ranch
Southern Nevada Water Authority
So NV Building Trades Council
Staheli Farms
Stewart-Nevada Enterprises
Stine Farm
Summit Engineering Corp
Sunnyside Ranch/ Rocking 13 Ranch
SWCA, Inc.
Terraspectra Geomatics
Tetra Tech, Inc.
The Campbell Company
Tin Cup Adventures
T-K Cattle
Toiyabe Café, Inc.
Tomera Ranches, Inc.
Trail Mountain, Inc.
Trout Unlimited
Tsosie & Hatch
Union Pacific Railroad
V Point Engineering
VLA
Western Marble, Inc.
White River Ranch, LLC
Wilkerson Consulting
Wingfield Nevada Group
Wyman Engineering Consultants

5.6.9 Media

Deseret News
Elko Daily Free Press
Ely Times
KKBR
KLAS-TV 8
KVMR FM
KWNA Radio
Las Vegas Review-Journal
Las Vegas Sun
Salt Lake Tribune
Sparks Tribune
Tonopah Times

5.6.10 Academia and Libraries

Beaver Library, Beaver, UT
Cedar City Library, Cedar City, UT
Clark County Library, Las Vegas, NV
College of Marin, Kentfield, CA
Delta City Library, Delta, UT
Elko County Library, Elko, NV
Lincoln County Library, Alamo, NV
Lincoln County Library, Caliente, NV
Mesquite Library, Mesquite, NV
Nephi Library, Nephi, UT
Nevada State Library, Carson City, NV
Northwestern University, Evanston, IL
Tonopah Public Library, Tonopah, NV
Tooele City Library, Tooele, UT
University of Nevada, Reno, NV
Utah State Library, Salt Lake City, UT
Utah State University, Logan, UT
University of Utah, Salt Lake City, UT
Washington County Library, St. George, UT
Washoe County Library, Reno, NV
White Pine County Library, Ely, NV

5.6.11 Individuals

Aanerud, Leroy
Abeyta, Ruben
Aboite, Aurora
Ackerman, Frank
Adams, Alma
Ahlvers, Fred
Aincky, Taj
Airola, Jerry
Alastuey, Stephen
Alcock, John
Alder, Deana
Alder, Preston and Andrew
Alder, Renee
Alder, William and Mechell
Alderson, George and Frances
Alexander, Dave
Alexander, Pam
Allen, Kirby
Allen, Brian
Althiser, Ken
Ambrose, Marilyn
Anderson, Dean
Anderson, Don
Anderson, Jerald and Elizabeth
Anderson, Kelvin
Anderson, Leora
Anderson, Marci
Anderson, Phil
Art, Andrae
Andrus, George
Annala, Holly
Anpu, S
Apperson, Michael
Arias, Ricardo
Arnold, Harlan and Mary
Ash, Karen
Ashdown, Laurence
Assuras, Jim
Atkinson, Mark
Atkinson, Oskar
Austin, Jerry and Pat
B, Tina
Bacon, Patricia
Bagley, Reuvo
Bahe, Ernie
Baker, Craig
Baker, Janille
Baker, Tom
Baker, Sylvia
Balvan, Juan
Bammes, Dane
Banuelos, Clifford
Barber, John
Barber, Buck
Barcomb, Cathy
Barkanyi, Frank
Barkley, Michael
Barr, Quinton
Bateman, Kyle
Bates, Jerald and Marlene
Bath, Donna
Bath, James
Baughman, Curtis
Baughman, Mike
Beall, Karen
Beers, Frank
Belknap, William
Bell, Edward and Cynthia
Bell, Robin
Bell, Cindy
Belz, Vanessa
Benezet, Louis
Benkovich, Bob
Benner, Dianne
Bennett, Gary
Benson, Robert
Bentley, Clint
Bettger, Gerald
Bevins, Earle
Biederman, Albert
Bill, Jason
Bill, Larson
Bills, Christy
Binderim, Darin
Bingaman, Kim
Bingham, Kelly
Bird, Mark
Bishop, Ken
Bishop, Matt
Bitton, Sandra
Blair, Hank
Blankenship, Heidi
Blazej, Nova
Blazes, Sharon
Blethen, John
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6. List of Preparers and Reviewers

6.1 Bureau of Land Management EIS Team

BLM Office/Team Member	Resource/Responsibility
Nevada State Office	
Amy Lueders	State Director
Penny Woods	Project Manager
Kim Dow	Deputy Project Manager, Natural Resources Lead, Wildlife Biology, Natural Resource Coordination
Kathy Cadigan	Administrative Record, Correspondence, Media
Sarah Peterson	State Office – Soil, Water, and Air Resources
David Jones	State Office – Air Quality
Tom Burke	State Office – Cultural and Tribal
Sandra Brewer	State Office – Wildlife Biologist
Jolynn Worley	Public Affairs
Ely District Office	
Rosey Thomas	District Manager
Mike Herder	Associate District Manager
Mary D'Aversa	Field Manager, Schell Field Office
Dan Netcher	Renewable Energy Project Manager, Ely Liaison, NEPA, Hazmat, Water, Geology, Mineral Resources
Elvis Wall	Tribal Consultation, Native American Concerns
Travis Young	NEPA
Melanie Peterson	Hazardous Materials/Safety
Dave Davis	Geology
Gus Malon	Wilderness, Visual Resource Management
Paul Podborny	Renewable Resources Supervisor, Schell Field Office
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Ben Noyes	Wild Horse and Burro Management
Craig Hoover	Range Management
Shawn Gibson	Archaeology

6.1 Bureau of Land Management EIS Team

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Nancy Williams	Wildlife
Alicia Styles	Section 7 Consultation
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Mark D' Aversa	Soils and Hydrology
Adam Johnson	Forestry, Fire
Southern Nevada District	
Catrina Williams	Southern Nevada District Liaison
Gayle Marrs-Smith	Management Oversight
Susanne Rowe	Cultural/Tribal, Southern Nevada
Mark Slaughter	Biology
Lisa Christianson	Air Quality
Utah State Office	
Verlin Smith	Branch Chief, Natural and Renewable Resources
Justin Jimenez	Coordinator – SNWA Project and Riparian/Fisheries Lead
Roy Smith	Water Rights, Hydrology
Jeremy Jarnecke	Soil, Water, Air
Ron Bolander	Botany and T&E Species
Steve Madsen	Wildlife
Phillip Zieg	Water Rights
Craig Egerton	Range
National Operations Center, Denver, Colorado	
Paul Summers	Hydrology

6.2 AECOM EIS Team (Third-party Consultant)

AECOM Team Member	Responsibility/Resource	Degree/Certifications	Experience (years)
Scott Ellis	Principal in Charge	BS Biology & English	39
Debby Sehi	Project Manager; Agency Liaison	BS Environmental Health	16
Rollin Daggett	Assistant Project Manager; Aquatic Resources	MS Freshwater & Marine Biology BS Zoology	36
Jamie Schlangen	Wildlife Biology	MS Applied Ecology MS National Resource Management and Environmental Policy BS Wildlife Ecology	11
Ellen Dietrich	Soils; NEPA Compliance	Graduate Studies, Soil Science/Archaeology BA Archaeology/Geology	39
Patrick Plumley	Water Resources	MS Geology BS Geology	24
Chris Dunne	Project Coordination; Wild Horses and Burros; Grazing/Range Management	BS Range Science	5
Ron Dutton	Socioeconomics; Environmental Justice	MS Economics BS Economics	33
George Blankenship	Environmental Justice	MA Urban and Regional Planning/Community Development BA Anthropology BA Social Work	31
Kim Munson	Cultural Resources; Native American Concerns	MA Anthropology BA Anthropology Integrating Cultural Resources into NEPA Compliance Heritage Resources Management - Section 106 Review	16
Bill Berg	Geology; Paleontology; Minerals	MS Geology BS Geology	34
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Randy Walsh	Vegetation	BS Natural Resources Management MS Forest Sciences	12
Courtney Taylor	Air and Climate	MS Atmospheric Science BA Environment, Economics, and Politics	10

6.2 AECOM EIS Team (Third-party Consultant)

AECOM Team Member	Responsibility/Resource	Degree/Certifications	Experience (years)
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Brent Read	GIS	M.S. Watershed Science B.S. Forestry	9
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Bruce Flinn	NEPA Review and Compliance; BLM Policies	Retired BLM Manager	34
John Godec	Public Participation/Facilitator	BA Communication MS Management	30

6.3 Cooperating Agencies

Federal Agencies

- Department of Agriculture, Forest Service (USFS)
- Department of Defense, Army Corps of Engineers (USACE)
- Department of Defense, Nellis Air Force Base
- Department of Interior, Bureau of Indian Affairs
- Department of Interior, Bureau of Reclamation
- Department of Interior, Fish and Wildlife Service (USFWS)
- Department of Interior, National Park Service

State Agencies

- Nevada Department of Wildlife (NDOW)
- State of Utah

Local Agencies

- Central Nevada Regional Water Authority
- Nevada Counties: Clark, Lincoln, White Pine
- Utah Counties: Juab, Millard, Tooele

6.4 Other Agencies

Nevada State Engineer's Office

The Nevada State Engineer's Office participated in the Groundwater Development Project as an observer. They will be provided a copy of the Final EIS when it is released to the public.

U.S. Geological Survey

The USGS has contributed to the NEPA process in the role of Technical Advisor to the BLM. Their assistance has included review of the project water model and technical advice regarding the design, calibration, and results of the modeling. This role also included review of the preliminary and administrative drafts of this Final EIS and they will be provided a copy of the Final EIS when it is released to the public.

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GLOSSARY

A-weighted scale (dBA). The most commonly used frequency weighting measure; simulates human sound perception and correlates well with human perception of the annoying aspects of noise.

Access. The physical ability to have legal ingress to and egress from public lands via public roads or on routes having public easements.

Accommodation (Wildlife). An adaptation or adjustment. Wildlife exhibits accommodation behavior in response to changes in habitat or other disturbance such as increased human presence and activity.

Acoustic Survey. A technique to identify presence of bat species, which utilizes specialized detecting equipment to record bat calls.

Acre-foot/acre-feet. A unit for measuring the volume of water equal to the quantity of water required to cover 1 acre to a depth of 1 foot and is equal to 43,560 cubic feet or 325,851 gallons. The term is commonly used in measuring volumes of water used or stored.

Adaptive Management. A process for continually improving management policies and practices by learning from outcomes of operation programs and new scientific information.

Adversely Affect. To impact negatively; cause harm or reduction, to diminish positive qualities, or to exacerbate negative qualities.

Albedo. A measure of how strongly a surface reflects light from light sources such as the Sun. It is therefore a more specific form of the term reflectivity. Albedo is defined as the ratio of total-reflected radiation to incident radiation. A high albedo is typical of bright surfaces, such as snow. A low albedo is typical of dark surfaces, such as the open ocean.

Alluvial Fans. A fan-shaped deposit of generally coarse material that is created where a stream flows out of the mountains and onto the valley floor. The material may be covered by vegetation.

Alluvium. Material deposited on the land by water, such as gravel, sand, silt, or clay.

Alpine Tarn. A high mountain lake or pool, formed in a bowl-shape at the head of a glacier.

Ambient. The environment as it exists at the point of measurement and against which changes or impacts are measured.

Amenity. A feature which adds to the value of the property or area from the perspective of property owners, guests, tourists, or other visitors to an area.

Amphibian. A class of cold-blooded animals that typically develop from a juvenile water-breathing form to an adult air-breathing form.

Ancillary Facilities. Areas required to support the main focus of construction or use, such as yards, stations, andaccess roads.

Angling, Angler. Fishing, a person who fishes using a hook and line.

Animal Unit. A metric defined for the purpose of measure grazing capacity, consisting of any of the following; one cow, one cow/calf pair, one horse, or five sheep.

Animal Unit Month. The forage needed to support 1 animal unit (see above) for 1 month. Approximately 800 pounds of forage.

Applicant–Committed Environmental Protection Measures. Actions agreed to in advance of project initiation by the proponent; designed to protect resources.

Appropriate Management Level. The optimum number of wild horses that provides a thriving natural ecological balance on the public range.

Aquatic Birds. Wading, swimming, and diving birds, such as waterfowl, shorebirds, seabirds, and rails.

Aquatic Larval Stage. The worm-like juvenile form of many insects before they change into adult insects. The juvenile form inhabits water.

Aquifer. A body of rock that is sufficiently permeable to conduct groundwater and to yield economically significant quantities of water to wells, springs, sands, and soils.

Archaeological Resource. Any material remains of past human life or activities of archaeological interest. These include, but are not limited to: pottery, basketry, bottles, weapons, projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal materials, or any portion or piece of any of the foregoing items. Nonfossilized and fossilized paleontological specimens, or any portion or piece thereof, shall not be considered archaeological resources unless found in an archaeological context. No item shall be treated as an archaeological resource unless such item is at least 50 years of age.

Archaeological Site. A geographic locale that contains the material remains of prehistoric or historic human activity.

Archaeology. The reconstruction of past cultures through their material remains and the study of how cultures change over time.

Area of Critical Environmental Concern (ACEC). Area approved through a land use plan where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect humans from natural hazards.

Area of Special Designation. Areas where special management attention is required to protect and prevent irreparable damage to important values, resources, systems or processes, or to protect life and safety from natural hazards.

Aridisols. Soils that occur under arid climates, where evaporation greatly exceeds precipitation. They are characterized by an accumulation of carbonates and other salts.

Association (Soil). A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single soil map unit.

Assumptions (for analysis). The basis for framing the analysis. Assumptions often are based on science, professional judgment, or both and typically are identified at the beginning of the environmental consequences section and, as needed, at the beginning of the program-specific environmental consequences analysis.

Authorized Use. This is the amount of use for which a grazing permittee is billed. It may or may not reflect the total active use. A permittee may be authorized to use less than, but not more than the authorized active use. Example: If a permittee has 500 animal unit months of active use, he may only be authorized 300 animal unit months for a certain year, but cannot be authorized above 500 animal unit months. This amount is subject to change from year-to-year, based on fluctuation of the permittees livestock herd, vegetation production, drought, or other applicable factors.

Avian. Relating to birds.

Avoidance Areas. Areas with sensitive resource values where rights-of-way would be strongly discouraged.

Beneficial Use. Any of various uses of water in an area. Water may be for agricultural, domestic, or industrial use, fish spawning, recreation, wildlife habitat, or other uses.

Best Management Practices. A set of practices which, when applied during implementation of management actions, ensures that negative impacts to natural resources are minimized. Best Management Practices are applied based on site-specific evaluation and represent the most effective and practical means to achieve management goals for a given site or resource.

Big Game. Native ungulate wildlife species that are hunted, such as elk, deer, bison, bighorn sheep, and pronghorn antelope.

Biological (Cryptogamic) Soil or Crust. Community of non-vascular primary producers that occur as a "crust" on the surface of soils; made up of a mixture of algae, lichens, mosses, and cyanobacteria (bluegreen algae).

Biological Diversity Index. A biological measure of the number of species or taxonomic groups.

Borrow Pit. An excavation dug to provide fill material to make up ground elsewhere.

Breccia Zones. Breccia is rock made up of angular fragments of other rocks, held together by mineral cement or a fine-grained matrix. Fault breccia is made by breaking and grinding rocks along a fault.

Brood. The young of an animal that is hatched or cared for at the same time.

Brood Range. The distance that the brood of a species travels, to forage and live.

Bureau of Land Management Sensitive Species. Plant or animal species that could become endangered or extirpated from a state, or within a significant portion of its range in the foreseeable future; is undergoing status review by the United States Fish and Wildlife Service; is undergoing significant current or predicted downward trend in habitat capability that would reduce a species' existing distribution, and/or downward trend in population or density such that federally listed, proposed, or candidate status may become necessary. Species typically consist of small and widely dispersed populations; inhabit ecological refugia, or specialized or unique habitats; or are state-listed, but may be better conserved through application of Bureau of Land Management sensitive species status. Listing is approved by the Bureau of Land Management State Director, Director of the Nevada Department of Wildlife, and Director of the Department of Conservation and Natural Resources.

Candidate Species. Those species for which the USFWS has sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list, but for which issuance of the proposed rule is precluded.

Canopy Cover. The percentage of ground covered by a vertical projection of the outermost perimeter of the natural spread of foliage of plants. Small openings within the canopy are included (Bureau of Land Management Technical Reference 4400-7).

Carbonate-rock. A class of sedimentary rocks composed primarily of carbonate minerals.

Carrying Capacity. The maximum population or level of activity that can be supported without degradation of the habitat or the population.

Cave Obligate. A species which can only live in caves or associated underground habitats.

Cave Resource. Any naturally occurring void, cavity, recess, or system of interconnected passages beneath the surface of the earth or within a cliff or ledge, including any cave resource therein, that is large enough to permit a person to enter, whether the entrance is excavated or naturally formed. Also included is any natural pit or sinkhole.

Cirque. A bowl shaped valley head, formed at the top of a valley glacier by erosion.

Classification, Soil. The systematic arrangement of soils into groups or categories on the basis of their characteristics.

Clastic. Clastic pertains to rock or sediment that is composed primarily of broken fragments that have been transported some distance from their origin.

Clay (Geology). A rock or mineral fragment of any composition finer than 0.00016 inch in diameter. (**Mineral**) A hydrous aluminum-silicate that occurs as microscopic plates, and commonly has the ability to absorb substantial quantities of water on the surface of the plates.

Clayey Soil. Any of a classification of clay soils: silty clay, sandy clay, or clay.

Clay-rich Gouge. The pulverized, clay-like material found along some faults; formed by the grinding of rock material during fault movement.

Climate. The average or prevailing weather conditions of a place over a lengthy period of years (Bureau of Land Management Technical Reference 4400-7).

Closed. Within the context of federal land management policies by the BLM, USFS, or other agencies, generally denotes that an area is not available for a particular use or uses; refer to specific definitions found in law, regulations, or policy guidance for application to individual programs.

Colluvial. Colluvial material consists of alluvium and angular fragments of original rocks that are typically found at the bottom or on lower slopes of hills.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Community Structure (Vegetation). Refers to the presence of multiple plant life forms (trees, shrubs, grasses, and forbs) and their relative abundance within a given vegetation community.

Compaction (Soil). An increase in soil bulk density of 15 percent or more from the undisturbed level.

Compaction Prone. Fine-textured soils that have clay loam or finer textures. These soils are especially prone to compaction when moist or wet.

Complex (Soil). A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Conifer. A tree of the order Coniferae with cones and needle-shaped or scale-like leaves.

Connectivity (Vegetation). A network of habitat patches linked by areas or corridors of like habitat; connectivity affects how organisms can move through the landscape.

Conservation Agreement. A voluntary agreement between FWS or NOAA Fisheries and other federal or non-federal landowners that identifies specific conservation measures that the participants of the agreement will undertake to conserve species covered by the agreement, none of which are listed under the Endangered Species Act, with the intention of preventing any need to list the species.

Construction Footprint. That area initially disturbed for the purpose of installing proposed facilities including power lines and pipelines.

Consumptive Use. The portion of water withdrawn from a surface or groundwater source that is consumed for a particular use (i.e. irrigation, domestic needs, and industry), and does not return to its original source or another body of water.

Continuum. A continuous series or whole, no part of which is noticeably different from its adjacent parts, although the ends or extremes are very different from each other.

Control. Eradicating, suppressing, reducing, or managing invasive species populations, preventing spread of invasive species from areas where they are present, and taking steps such as restoration of native species and habitats to reduce the effects of invasive species and prevent further invasions.

Corridor. A wide strip of land within which a proposed linear facility could be located; a path for travel by wildlife.

Corvids. Corvids are birds in the family Corvidae. In North America they include crows, ravens, magpies, jays and nutcrackers.

Cover (Vegetation). Any vegetation material that overlies the soil surface and protects it against erosion.

Cover (Wildlife). Any form of environmental protection that helps an animal stay alive and reproduce (mainly shelter from weather and concealment from predators).

Crepuscular. Occurring or active during twilight.

Critical Habitat (threatened and endangered species). This habitat is defined as (1) the specific areas within the geographical area currently occupied by a species, at the time it is listed in accordance with the Endangered Species Act, on which are found those physical or biological features (i) essential to the conservation of the species and (ii) that may require special management considerations or protection, and (2) specific areas outside the geographical area occupied by a species at the time it is listed upon a determination by the Secretary that such areas are essential for the conservation of the species.

Cultural Resources. A definite location of human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups (BLM Manual 8100). Federal agencies are mandated to identify, evaluate and mitigate impacts to any cultural resource more than 50 years old.

Cultural Resources Investigations

Class I (Files Search) Inventory. A file search completed to identify all previously conducted cultural resources investigations and previously recorded cultural resources within a defined distance (typically 1 mile) on either side of proposed rights-of-way, roads, and other project facilities.

Class III (Pedestrian) Inventory. A Class III intensive field inventory to locate and record cultural resources and places of traditional, cultural, and religious importance to Native Americans.

Cumulative Effect. The impact that results from identified actions when they are added to other past, present, and reasonably foreseeable future actions regardless of who undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Deciduous. Plants that shed their foliage at the end of the growing season.

Delist. To remove from the federal list of endangered and threatened species (50 CFR 17.11 and 17.12) because such species no longer meets any of the five listing factors provided under section 4(a)(1) of the Endangered Species Act and under which the species was originally listed (e.g., because the species has become extinct or is recovered).

Designated Recreation Area. A BLM-designated land area having significant recreational resource value. This status allows BLM recreation programs to allocate funds, management, and personnel toward the preservation and/or enhancement of certain recreation opportunities specific to the site.

Designated Wilderness. See Wildnerness.

Designation. The approval of a resource management plan, plan revision, or plan amendment constitutes formal designation of off-highway vehicle use areas.

Diminish. To decrease in size, extent, or range.

Direct Mortality. The death of an individual plant, fish, or animal, the demise of which can be attributed to a specific event or person.

Dispersed Recreation Activities. Passive or active outdoor recreation that occurs outside of developed sites with modern facilities and where concentrated use occurs.

Distributed Locations (pumping). Groundwater well locations that are selected based on modeling, test well yields, environmental factors, and other criteria with the goal of maximizing pumping and minimizing environmental impacts.

Diurnal. Active during daylight hours.

Drainage (Surface). Runoff, or surface flow of water, from an area.

Drawdown. The lowering of the water level in a well, spring, or water body as a result of water withdrawal in another area; the reduction in head at a point caused by the withdrawal of water from an aquifer.

Drawdown Contour. A boundary derived from water modeling that depicts a certain reduction in the water level compared to its previous level.

Droughty Soils. Coarse-textured soils with poor water holding capacity that can be difficult to revegetate during periods of low precipitation.

Dynamic. Variable or changeable.

Earnings. Wages and salaries, other labor income, and proprietor's income (including inventory valuation and capital consumption adjustments).

Ecological System. All the organisms in a particular region and the environment in which they live. The elements interact with each other in some way, and so are depend on each other either directly or indirectly.

Ecology. The science of the interrelationships between organisms and their environment.

Ecosystem. The complex of a community of organisms and their environment.

Endangered Species. Any species defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range and published in the Federal Register.

Endangered Species Act (ESA) of 1973, as amended. Federal legislation that is intended to provide a means to conserve the ecosystems upon which endangered and threatened species depend and provide programs for the conservation of those species, thus preventing extinction of plants and animals.

Endemic Species. Native to, and restricted to, a particular geographical region, community type, or specific habitat; generally used for species with comparatively restricted distribution.

Entisols. Soils defined by the absence or near absence of layers that clearly reflect soil-forming processes. Typical geographic settings include areas of active erosion or deposition (i.e., steep slopes or floodplains), areas of quartzite bedrock or quartz sand (i.e., major desert and dune regions), and wetlands.

Environmental Assessment (EA). A systematic analysis of site-specific Bureau of Land Management activities used to determine whether such activities have a significant effect on the quality of the human environment and whether a formal environmental impact statement is required and also to aid an agency's compliance with the National Environmental Policy Act when no Environmental Impact Statement is necessary.

Environmental Impact Statement (EIS). A formal document to be filed with the Environmental Protection Agency and that considers significant environmental impacts expected from implementation of a major federal action.

Ephemeral Stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no continuous supply from melting snow or other source, and its channel is above the water table at all times.

Erionite. A mineral occurring in some volcanic tuff deposits that may be hazardous to human health if inhaled.

Erosion (Accelerated). Erosion that is much more rapid than natural or geologic erosion, occurring mainly as a result of human or animal activities or an event catastrophic in nature, such as a fire that exposes the soil surface.

Erosion (Geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of other landscape features as flood plains and coastal plains; synonymous with *natural erosion*.

Erosion. Detachment and movement of soil or rock fragments by water, wind, ice, or gravity. Wearing away of the land surface by running water, wind, ice, or other geologic agents, including such processes as gravitational creep.

Evapotranspiration. The water lost to the atmosphere from the ground surface, evaporation from the capillary fringe of the groundwater table, and the transpiration of groundwater by plants whose roots tap the capillary fringe of the groundwater table.

Exclusion Areas. Areas with sensitive resource values where rights-of-way would be prohibited.

Exotic Species. An organism or species that is not native to the region in which it is found. Synonym non-native: Not native; alien; a species that has been introduced into an area.

Facultative Phreatophyte. Plants that utilize moisture from groundwater for a portion of their water requirements. Plants that are able to take advantage of groundwater when present but can also tolerate periods of low water availability. These species typically occur where water and salts accumulate (Lichvar and Dixon 2007).

Faults (Geologic). A crack or shift in the Earth's crust resulting from the displacement of bedrock.

Fine Textured Soil. Sandy clay, silty clay, or clay.

Fire Suppression. All the work activities connected with fire-extinguishing operations, beginning with the discovery and continuing until the fire is completely extinguished.

Floodplain. A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

Fluvial (Fluviatile) Deposit. A sedimentary deposit laid down, transported by, or suspended in, a stream.

Forage. The plant material actually consumed by (or available to) grazing animals.

Forb. Any herbaceous plant not a grass or a grasslike species.

Fragmentation. Process of reducing the size and connectivity of vegetated areas or habitat by division into sections or fragments; a measure of connectivity in vegetative and/or habitat conditions across a landscape.

Friable Soils. Soil that has the crumbly texture ideal for the root growth of plants, usually a loam.

Fugitive Dust. A non-point source of air pollution, such as from unpaved roads, agricultural croplands, and construction sites.

Full Build Out Time Frame. The term "full build out time frame" refers to a future representative point in time selected for comparison of potential effects associated with each of the alternatives. According to the current project schedule, the full build out time frame for Alternative A (Proposed Action) corresponds to the year 2050.

Gabion Structures. Rectangular containers (baskets) fabricated of heavily galvanized wire, which are filled with stone and stacked on one another, usually in tiers that step back with the slope rather than vertically. Used to stablilize a slope by eliminating or slowing slope erosion.

Game Fish. Species of fish that are managed by state wildlife agencies for the purpose of sport fishing.

Genetic Isolation. The lack of interbreeding, thus genetic mixing, within a species. This can occur when a portion of a species population is no longer in contact with the larger population to allow breeding.

Geographic Information System. A computer system capable of storing, analyzing, and displaying data and describing places on the earth's surface.

Graben. A fault-bounded down-dropped portion of the Earth's crust.

Gravel (Geology). Unconsolidated, rounded rock fragments greater than 0.08 inch in diameter. Sizes range from pebbles (0.008 to 2.5 inches) to cobbles (2.5 to 10 inches) to boulders (greater than 10 inches).

Greenhouse Gas. Gases which absorb outgoing terrestrial radiation, such as water vapor, methane, chlorofluorocarbons, and carbon dioxide.

Groundwater. Subsurface water that is in the zone of saturation. The top surface of the groundwater is the "water table." Source of water for wells, seepage, springs.

Guano. Accumulated dung and remains of birds and bats, which can be used for fertilizer.

Gully. A miniature valley with steep sides caused by erosion from running water and through which water ordinarily flows only after rainfall.

Habitat. An environment that meets a specific set of physical, biological, temporal, or spatial characteristics that satisfy the requirements of a plant or animal species or group of species for part or all of their life cycle.

Habitat Degradation. The pattern of changes in vegetation and other habitat components that result in loss of food supplies, water sources, cover quality, or space for a wildlife species.

Habitat Fragmentation. The division of large contiguous blocks of wildlife habitat into isolated smaller parcels separated by distances great enough to discourage wildlife movement between parcels.

Habitat Matrix. A habitat matrix identifies and relates the ways that species use different types of habitat.

Habituate. Learned behavior in which an animal exhibits a lessened response to stimulus, such as traffic or other human activity.

Halogeton. A coarse annual herb introduced into North America from Siberia; considered a noxious weed in most areas. Dangerous to sheep and cattle on western rangelands because of its high oxalate content.

Harass. An intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns including, but not limited to, breeding, feeding, and sheltering. (50 CFR 17.3)

Harm. An act which actually kills or injures listed wildlife; harm may include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering". (50 CFR 17.3)

Hazardous Materials. Anything that poses a substantive present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Herbaceous. A plant that has leaves and stems that die down at the end of the growing season to the soil level. It has no persistent woody stem above ground.

Herd Area. Areas with historic use by wild horses and burros.

Herd Management Area. Areas designated for management of wild horses as one of the multiple uses, where the long term maintenance and management of wild horses can occur due to adequate resources.

Herd. A number of horses, cattle, elk, or other animals feeding, living, or being driven together.

Herpetofauna. A term referring to reptiles and amphibians. This group includes frogs, toads, turtles, salamanders, snakes and lizards.

Herptile Species. A species of reptile or amphibian.

Historic Active Fault. A fault that has been created, shifted, or slipped within the last 150 years.

Historic Property. "...any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register. The term includes, for purposes of these regulations, artifacts, records, and remains that are related to and located within such properties" (BLM Manual 8100).

Historic. Period wherein nonnative cultural activities took place, based primarily upon European roots, having no origin in the traditional Native American culture(s). Historic refers to that portion of the past that is documented by written records.

Holocene Active Fault. A fault that has moved within the last 15,000 years.

Horst. A geological fault block feature formed when a portion of the earth's crust remains stationary or is uplifted and the land drops on either side. It typically is bounded by normal faults or graben.

Hydric Soils. Soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic (without oxygen) conditions in the upper part.

Hydrogeologic Units. Typically a simplified representation of the soil layers in an area from borehole field data.

Hydrographic Basins. Local drainage basins within large multi-basin flow systems. Hydrographic basins (or areas) are defined by the State Engineer's Office. The terms hydrographic areas, hydrographic basins, and groundwater basins often are used interchangeably to describe the same area in published literature and reports.

Hydrologically Connected. Areas where the groundwater is linked and flow is contiguous.

Hydrologic Basins. A broad tract of land in which the rock strata are tilted toward a common center; an extent of land separated from adjacent basins by a drainage divide.

Hydrologic Linkages. Areas where surface or groundwater flow occurs between hydrologic basins.

Hydrostatic Water. Water used to pressure test a pipeline for structural integrity.

Igneous Rock. Rock that solidified from a molten or semimolten state. The major varieties include intrusive (solidified beneath the surface of the Earth) and volcanic (solidified on or very near the surface of the Earth).

Impact. An impact has both space and time components and can be described as the change in an environmental factor or characteristic over a specific period and within a defined area. The change results from a particular activity compared with the situation which would have occurred had the activity not been initiated.

Important Bird Area (IBA). A site designated by the Audubon Society which provides essential habitat for one or more species of bird. IBAs include sites for breeding, wintering, and/or migrating birds. IBAs may include public or private lands, or both, and they may be protected or unprotected.

Incomplete or Unavailable Information. When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an Environmental Impact Statement and there is incomplete or unavailable information, the agency shall always make it clear that such information is lacking (Council on Environmental Quality 1502.22). These are identified at the beginning of the environmental consequences section.

Incremental. Increasing gradually by regular degrees or additions; an increase of some amount, either fixed or variable.

Indian tribe. As defined in Section 301 of the National Historic Preservation Act, "an Indian tribe, band, nation, or other organized group or community, including a Native village, Regional Corporation or Village Corporation, as those terms are defined in section 3 of the Alaska Native Claims Settlement Act [43 U.S.C. 1602], which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians" (BLM Manual 8100).

Indicators. Indicators are observations or measurements of physical, chemical, or biological factors used to evaluate site conditions or trends, appropriate to the potential of the site. Indicators are used to determine whether or not standards are being met.

Indigenous. Living naturally within a given area and was part of the area's flora or fauna prior to human settlement of the region.

Indirect effect. Effects caused by the action that are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Infiltration Rate. Maximum rate at which soil under specified conditions can absorb rain or shallow impounded water; expressed in quantity of water absorbed by the soil per unit of time, e.g., inches/hour.

Infiltration. The flow of a fluid into a substance through pores or small openings. The process by which water seeps into a soil, as influenced by soil texture and aspect and vegetation cover.

Infrastructure. The underlying foundation or basic framework (as of a system or organization); the resources (as personnel, buildings, or equipment) required for an activity, the basic facilities needed for the functioning of a community or society, such as transportation and communications systems, water and other utility systems, schools, and prisons.

Inhibit. To limit the range or extent of.

Insectivores. An organism that feeds mainly on insects.

Intermittent Stream. A stream which carries water a considerable portion of the time, but which ceases to flow occasionally or seasonally because bed seepage and evapotranspiration exceed the available water supply.

Intermontane. Occurring or situated between mountain ranges.

Inter-Specific Competition. Individuals of one species suffer a reduction in reproductive success, survivorship, or growth as a result of resource exploitation or interference by individuals of a second species.

Intra-Specific Competition. Individuals of the same species have very similar resource requirements and if these resources are limiting, they will compete for access.

Introduced Species. A species living outside its native distributional range, which has arrived there by human activity, either deliberate or accidental.

Intrusives. Igneous rock bodies that have forced their way in a molten state into surrounding rock.

Invasive Species. An alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

Invasive. A species which takes over a new habitat where it was not previously found, often to the detriment of species there previously.

Invertebrate. An animal without a backbone.

Isotopic. Referring to an isotope, a form of a chemical element with the same atomic number as another element but having a different atomic mass.

Jack and Bore Construction. A technique for installing a pipeline under a resource area such as a stream, where a rotating cutting head and auger removes soils while a steel casing is advanced hydraulically. This technique avoids the surface disturbance associated with more conventional trench and cover construction used for pipelines.

Karst. Landscape shaped by the dissolving of soluble bedrock (usually limestone or dolomite).

Key Observation Point. An observer position on a travel route used to determine visible area.

Lacustrine Deposits. Stratified materials deposited in lake waters and later become exposed either by the lowering of the water level or by the elevation of the land.

Lacustrine. A type of deposit that comes from lakes which previously occupied the area. Fine-grained soils that have settled through the water and accumulated on the lake bottom.

Land Available for Disposal. Public land that has been made available for or designated as suitable for future sale or lease by local, state, or federal legislation.

Land Use Plan. A land use plan is a public document that sets aside different areas for different uses, and describes what activities are permitted or not, and any limitations or conditions associated with such use.

Late Quaternary Active Fault. A fault that has moved within the last 130,000 years.

Leasable Minerals. Two classes of minerals (fluid and solid) that can be or have been leased to individuals or entities for their exploration and development.

Lek. An assembly area where birds, especially sage grouse, carry on display and courtship behavior.

Lek (Active). A lek that had two or more birds present during at least one of three or more visitations in a given breeding season. For a strutting ground to attain this status it must also have had 2 or more birds present during at least 2 years in a 5-year period (Connelly et al. 2003).

Lek (Historic). A lek that has not had bird activity for twenty years or more and has been checked according to protocol at least intermittently.

Lek (Inactive). A lek that has been surveyed three or more times during one breeding season with no birds detected during the visitations and no sign observed on the lek. If a lek is only visited once during a breeding season and was surveyed under adequate conditions and no birds were observed at the location during the current and the previous year and no sign was observed at the lek, then an inactive status can be applied to the lek.

Lek (Unknown). A lek that may not have had birds present during the last visitation, but could be considered viable due to the presence of sign at the lek. A lek that was active in the previous year, but was inadequately sampled in the current year with no birds observed could also be classified as unknown.

Life Zone. A means of describing land areas which have a generally uniform climate and soil, therefore a high degree of uniformity in species composition.

Light Pollution. Excessive or obtrusive artificial light.

Limestone. A sedimentary rock consisting mainly of calcium carbonate.

Lithologic. The character of a rock formation; *also* : a rock formation having a particular set of characteristics.

Litter. The uppermost layer of organic debris on the soil surface; essentially the freshly fallen or slightly decomposed vegetal material (Bureau of Land Management Technical Reference 4400-4).

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Locatable Minerals. Those that have been described as "valuable mineral deposits." These include precious and base metal ores such as gold, silver, copper, or lead, and certain industrial minerals such as gypsum, chemical grade limestone, and chemical grade silica sand. Uncommon varieties of mineral materials such as pozzolan, pumice, decorative rock, and

cinders also are regulated as locatable minerals. These minerals are regulated under the General Mining Law of 1872, as amended, and Surface Use and Occupancy Act of July 23, 1955.

Low Reclamation Potential. Soils that are saline, sodic, or strongly alkaline/acid and have low potential for successful stabilization if disturbed. These chemical characteristics are likely to adversely affect plant reestablishment and growth.

Macroinvertebrates (Terrestrial). Animals without backbones, which are large enough to be visible without magnification.

Macroinvertebrates (Aquatic). Animals without backbones that are larger than 0.5 millimeter in length and inhabit the bottom substrates or vegetation in aquatic environments.

Management Objective (Range). The objectives for which rangeland and rangeland resources are managed which includes specified uses accompanied by a description of the desired vegetation and the expected products and/or values.

Management Plan. A program of action designed to reach a given set of objectives.

Map Unit. The basic system of description in a soil survey and delineation on a soil map. Can vary in level of detail.

Marsh. Flat, wet, treeless areas usually covered by standing water and supporting a native growth of grasses and grasslike plants.

Maternal Roost, Maternity Roost. A site that is used by a group of bats and their young.

Mesic Habitats. Habitats with a moderate or well-balanced supply of moisture.

Metamorphosed. Rock that has been altered in composition, texture, or structure by heat and/or pressure.

Microclimate. A local atmospheric zone where the climate differs from the surrounding area.

Microsiemens Per Centimeter. A unit of measure for specific or electrical conductivity of water. Higher values reflect greater levels of dissolved conductors (e.g., sodium, calcium, or magnesium salts).

Mid-Late Quaternary Active Fault. A fault that has moved within the last 750,000 years.

Migration Corridor. A route followed by animals when moving from one habitat area to another.

Military Operations Area. A type of low-altitude military airspace that is controlled, when active, to separate military activities from civilian air traffic flying under instrument Flight Rules. Training activities typically include basic fighter maneuvers, air combat tactics, low-altitude tactical navigation, and simulated air-to-surface missions.

Mineral Materials. Common geologic materials that include sand, gravel, and common clay. Mineral materials are sold through contract and are regulated under the Mineral Material Act of July 23, 1947, as amended, and the Surface Use and Occupancy Act of July 23, 1955.

Mist Net Surveys. A method of capturing birds and bats in a lightweight net to mark, band, and perform other measurement and data collection.

Mitigate, Mitigation. 1) Avoiding or reducing possible adverse impacts to a resource by limiting the timing, location, or magnitude of an action and its implementation; 2) rectifying possible adverse impact by repairing, rehabilitating or restoring the affected environment or resource; 3) reducing or eliminating adverse impacts by preservation and maintenance operations during the life of an action.

Mitigation Measure. A measure or action taken to reduce the adverse impacts to the environment from implementation of a project or another action. Such measures may include avoidance, replacement, restoration, relocation, timing of operations, etc.

Mollisols. Soils that have a dark colored surface horizon that are base rich. They often contain high organic matter content, a light-colored layer near the surface, and a shallow layer with high clay content, sometimes also containing a dense pan layer that is high in calcium carbonate.

Monitoring. The periodic observation and orderly collection of data to evaluate: 1) Effects of management actions; and 2) effectiveness of actions in meeting management objectives (43 Code of Federal Regulations 4100.0.5). The orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives. (BLM Technical Reference 4400-7).

Montane Shrubland. High altitude shrublands located above the tree line.

Moraine. Any glacially formed accumulation of unconsolidated glacial debris (soil and rock) which can occur in currently glaciated and formerly glaciated regions, such as those areas acted upon by a past ice age.

Morphology. The branch of biology that deals with the form and structure of organisms without consideration of function; the form and structure of an organism or one of its parts.

Multiple Use. The management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people.

Multiplier. A change in an economic measure resulting from a specified change in some other economic measure.

Mylonite Zones. Mylonite is a brecciated, metamorphic rock frequently found in a fault zone; formed by the crushing actions of fault movement.

National Ambient Air Quality Standards (NAAQS). The allowable concentrations of air pollutants in the ambient (public outdoor) air. National ambient air quality standards are based on the air quality criteria and divided into primary standards (allowing an adequate margin of safety to protect the public health) and secondary standards (allowing an adequate margin of safety to protect the public welfare).

National Environmental Policy Act of 1969 (NEPA). A United States environmental law that established a U.S. national policy promoting the enhancement of the environment; also established the President's Council on Environmental Quality (CEQ). NEPA's most significant effect was to set up procedural requirements for all federal government agencies to prepare Environmental Assessments (EAs) and Environmental Impact Statements (EISs) containing statements of the environmental effects of proposed federal agency actions.

National Register of Historic Places. A register of districts, sites, buildings, structures, and objects, significant in American history, architecture, archaeology and culture, established by the "Historic Preservation Act" of 1966 and maintained by the Secretary of the Interior.

Native Species. With respect to a particular ecological system, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecological system.

Natural Resources. These include topography, soil, water courses and/or waterbodies, geological formations, vegetation, and fish and wildlife.

Natural System. This refers to a biological, soil, and physical environment largely, but not necessarily entirely, controlled by natural processes rather than by intensive human activity, e.g., the comparison between rangelands and tilled agricultural croplands.

Negligible. Insignificant; able to be ignored or excluded from consideration; too small or unimportant to be of concern.

Neotropical Migrants. A bird species that breeds in North America and spends the non-breeding seasons south of the Tropic of Cancer.

Nocturnal. Species that are active during the dark hours.

Noise Attenuation. The reduction of a noise level from a source by such means as distance, ground effects, or shielding.

Noise Pollution. Displeasing human, animal, or machine-created sound that disrupts the activity or balance of human or animal life.

Noxious Weed. Any plant designated by a federal, state, or county government as injurious to public health, agriculture, recreation, wildlife, or property.

Nursery Colony. A site where a group of female bats bear and raise young.

Nutrient (Plant). Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil, and carbon, hydrogen, and oxygen obtained from the air and water.

Obligate Phreatophyte. Plants which typically require access to groundwater at shallow soil depths for the majority of the year.

Off-highway Vehicle. A vehicle that can be operated off of improved and regularly maintained roads.

Organic Matter. Plant and animal residue in the soil in various stages of decomposition.

Paleontology. The study of fossils; what fossils tell us about the ecologies of the past, about evolution, and about our place, as humans, in the world. Informs us about interrelationship between the biological and geological components of ecosystems over time.

Parameter. Any of a set of properties whose values determine the characteristics or behavior of something

Passerine. Referring to birds in the order Passeriformes, which includes perching birds.

Perched Aquifer. An aquifer that has a confining layer below the groundwater, and sits above the main water table.

Perennial Springs. A spring in which water is present during all seasons of the year.

Perennial Stream. A stream in which water is present during all seasons of the year.

Perennial Yield (sometimes also referred to as sustainable yield). The amount of usable water from a ground-water aquifer that can be economically withdrawn and consumed each year for an indefinite period of time. It can not exceed the natural recharge to that aquifer and ultimately is limited to maximum amount of discharge that can be utilized for beneficial use.

Permeability. The quality of the soil that enables water to move downward through the profile, measured as the number of inches per hour that water moves downward through the saturated soil.

Permit. Authorization in writing by the authorized officer or other person authorized by the United States Government, and is a contract between the permittee and the United States.

Permitted Use. The forage allocated by, or under the guidance of, an applicable land use plan for livestock grazing in an allotment under a permit or lease and is expressed in animal unit months.

Personal Income. Employee compensation plus property income.

Phase. A descriptor used to describe multiple identifiable plant communities within a particular state of the state-and-transition model. Communities may shift over time in a reversible manner among phases in a state in response to climate, grazing, and numerous other disturbance factors. As vegetation communities shift among phases, the vegetation and soil maintain resilience to return with similar characteristics.

Phreatophyte. Phreatophytes are deep rooted trees and shrubs that obtain a dependable water supply from the saturated soil water table, maintaining water status that is largely independent of soil water derived from incident precipitation.

Phyla. The second largest taxonomic grouping. Phyla are groups of taxonomic classes of organisms with shared characteristics.

Physiographic Province. A geographic region with similar climatic, land form, and geologic features, and which is significantly different from adjacent regions.

Piezometer. A groundwater-elevation monitoring device.

Plant Cover. 1) The plants or plant parts, living or dead, on the surface of the ground. Vegetative cover or herbage cover is composed of living plants and litter cover of dead parts of plants. 2) The area of ground cover by plants of one or more species.

Playa. Dry lake.

Pluvial Lake. A lake formed during a period of exceptionally high rainfall (such as during a time of glacial advance during the Pleistocene epoch) and now either extinct or existing as a remnant, such as Lake Bonneville.

Potentiometric Surface. A potentiometric surface is one that represents the static head of groundwater in tightly cased wells that tap a water-bearing unit (i.e., aquifer).

Point of Diversion. A specific location or area granted by the State Engineer for pumping water from an underground aquifer.

Points of Diversion (pumping). Groundwater well locations that are selected based on the locations specified in the water rights application. Generally, wells will be located within one mile of the applied-for point of diversion.

Primary Road. A high specification permanent road which is maintained periodically and serves as a main artery in a network of roads.

Prime Farmland. Land that has the best combination of physical and chemical characteristics for producing crops that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods.

Priority Habitat. A priority habitat may be described by a unique vegetation type or by a dominant plant species that is of primary importance to priority fish and wildlife. A priority habitat may also be described by a successional stage (e.g., old growth, mature forests). Alternatively, a priority habitat may consist of a specific habitat element (e.g., spring, stream, cave) of key value to priority fish and wildlife. A priority habitat may contain priority and non-priority fish and wildlife.

Productivity (Soil). The fertility or capacity of soil to support the growth of vegetation. The organic fertility or capacity of a given area or habitat.

Productivity. The potential rate of incorporation or generation of energy or organic matter (biomass) by an organism, population or trophic unit per unit time per unit area; plant productivity is termed primary production, and animal productivity is termed secondary production.

Predation. Predation describes a biological interaction where a predator (an organism that is hunting) kills and feeds on its prey.

Profile (Soil). A vertical section of the soil extending through all its horizons and into the parent material.

Proliferation. A rapid increase or growth.

Proposed species. A species for which a proposed rule to add the species to the federal list of threatened and endangered species has been published in the Federal Register.

Proximity. The region close to, or near.

Public Land. Any land or interest in land owned by the United States and administered by the Secretary of the Interior through the Bureau of Land Management.

Public Scoping. Discussions with and disclosure to agencies and the public with regard to a project or undertaking wherein areas of concern or issues to be addressed in a NEPA document are determined.

Pumping Effects. Any impact to natural or man-made resources that can be directly attributed to groundwater pumping.

Quality (Soil). Soil quality is the capacity of a specific kind of soil to function, within natural or managed ecological system boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation. Changes in the capacity of soil to function are reflected in soil properties that change in response to management or climate.

Quaternary Active Fault. A fault that has moved within the last 1.6 million years.

Radiative Forces. The change in net irradiance at the atmospheric boundary between the troposphere and the stratosphere (the tropopause). *Net irradiance* is the difference between the incoming radiation energy and the outgoing radiation energy in a given climate system and is measured in Watts per square meter. A positive forcing (more incoming energy) tends to warm the system, while a negative forcing (more outgoing energy) tends to cool it. Possible sources of radiative forcing are changes in solar radiation, or the effects of variations in the amount of greenhouse gases and aerosols present.

Radionuclides. A naturally occurring or artificially produced radioactive element or isotope that may be hazardous to health, depending on composition and level of exposure.

Reflectivity. The fraction of incident radiation reflected by a surface. Most surfaces can be divided into those that give specular reflection and those that give diffuse reflection. For specular surfaces, such as glass or polished metal, reflectivity will be nearly zero at all angles except at the appropriate reflected angle. For diffuse surfaces, such as matte white paint, reflectivity is uniform; radiation is reflected in all angles equally or near-equally

Range. An open region over which animals may roam and feed; the region throughout which a kind of organism or ecological community naturally lives or occurs.

Range Improvement. An authorized physical modification or treatment designed to improve production of forage; change vegetation composition; control patterns of use; provide water; stabilize soil and water conditions; restore, protect and improve the condition of rangeland ecosystems to benefit livestock, wild horses, and fish and wildlife. The term includes but is not limited to, structures, treatment projects, and use of mechanical devices or modifications achieved through mechanical means.

Rangeland Health. The degree to which the integrity of the soil and the ecological processes of rangeland ecosystems are sustained.

Raptor. A bird of prey, including eagles, hawks, falcons, osprey, and owls.

Recharge. The downward movement of surface water through the soil to groundwater resulting in replenishing the groundwater in the aquifer.

Reclamation. The process by which lands disturbed as a result of human activity are restored by grading, planting, seeding, etc., to stabilize the disturbed area and simulate original conditions.

Recovery Plan. A document which details the goals, tasks required, likely costs, and estimated timeline to recover threatened and endangered species (i.e., increase their numbers and improve their management to the point where they can be removed from the threatened or endangered species list).

Recreation Site. An area where management actions are required to provide a specific recreation setting and activity opportunities, to protect resource values, provide public visitor safety and health, and/or to meet public recreational use demands and recreation partnership commitments. A site may or may not have permanent facilities.

Refugia. An isolated area where extensive changes, typically due to changing climate or by human disturbance, have not occurred and where plants and animals typical of a region may survive.

REGAP. Re-mapping under the Gap Analysis Program. The purpose of the National Gap Analysis Program (GAP) is to provide broad geographic information on the status of ordinary species (those not threatened with extinction or naturally rare) and their habitats to provide land managers, planners, scientists, and policy makers with the information they need to make better-informed decisions. Existing natural vegetation is mapped from satellite imagery and other records using the National Vegetation Classification System to the level of dominant or co-dominant plant species.

Regional Air Quality. The measure in the outdoor atmosphere of one or more contaminants such as dust, fumes, gas, mist, odor, smoke, or vapor.

Reliant. Depending on something for support, such as habitat components.

Research Natural Area. An area preserved for research and education where natural processes predominate. Under current BLM policy, these areas must meet the relevance and importance criteria of an area of critical environmental concern and are designated as an area of critical environmental concern.

Residual Effects. Remaining results or conditions after project and mitigation completion.

Residual Impacts. Impacts remaining after mitigation measures have been implemented.

Resistance. The ability to resist; especially, the inherent capacity of a living organism (or assemblage of organisms) to resist external forces and adverse circumstances such as disease, drought, lack of nourishment, or toxic agents.

Resource. A component of the environment that can be utilized by an organism.

Resource Management Plan. A Bureau of Land Management multiple-use planning document, prepared in accordance with Section 202 of the Federal Land Policy and Management Act, that:

- Establishes resource conditions goals and objectives to be attained;
- Allocates resources and identifies allowable uses;
- Identifies land area for limited, restrictive, or exclusive uses; and
- Provides guidance for implementation of the decisions made in the plan.

Restoration. Holistic actions taken to modify an ecological system to achieve desired, healthy, and functioning conditions and processes. Generally refers to the process of enabling the system to resume its resiliency to disturbances.

Rhyolite. A fine-grained light-colored silica-rich igneous rock composed largely of potash feldspars and quartz.

Right-of-way. A permit or an easement authorizing the use of public land for certain specified purposes, commonly for pipelines, roads, telephone lines, electric lines, reservoirs, etc. Also, the reference to the land covered by such an easement or permit.

Riparian. Referring to or relating to areas adjacent to water or influenced by free water associated with streams or rivers on geologic surfaces occupying the lowest position of a watershed. Pertaining to, living or situated on, the banks of rivers and streams.

Road. Travel route that has been improved and maintained by mechanical means to ensure relatively regular and continuous use.

Rock art - A term in archaeology for any markings that were made on natural stone by human beings. They include Petroglyphs (carvings into stone surfaces), and Pictographs (rock and cave paintings).

Runoff. The (surface) water that flows off the surface of the land without sinking into the soil. The precipitation discharged into stream channels from an area.

Sacred Site. Any specific, discrete, narrowly delineated location of federal land that is identified by an Indian tribe, or individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site (Executive Order 13007, Section 7 1[b][iii]).

Salable Minerals. See Mineral Materials.

Saline Soil. A soil containing soluble salts in an amount that impairs the growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand (Geology). A rock fragment or article between 0.0025 and 0.08 inch in diameter.

Scrub. Refers to a stand of vegetation characterized by thick growth of dwarf or stunted trees and shrubs and a poor soil.

Secondary Road. A road constructed for a specific use or single operation and normally abandoned upon completion of the operation.

Section 7 of the Endangered Species Act. Describes the responsibilities of Federal agencies in conserving threatened and endangered species.

Sediment. Soil, rock particles, and organic or other debris carried from one place to another by wind, water or gravity.

Sedimentary Rocks. Rocks formed by accumulation and cementation of minerals transported by wind or water, or chemically precipitated.

Seep. Wet areas, normally not flowing, arising from an underground water source.

Seismicity. The world-wide and local distribution of earthquakes in space and time; a general term for the number of earthquakes in a unit of time.

Series (Soil). A nationally defined soil type set apart on distinct soil properties that affect use and management. In a soil survey, this includes a group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Severe Water Erosion Potential. Used to indicate the most highly erodible soils caused by raindrop splash or surface water runoff . The estimates are based on composition of the whole soil, modified by the presence of rock fragments and slope.

Severe Wind Erosion Potential. Used to indicate the most highly erodible soils based on the composition of sand, silt, and clay and the susceptibility of soils to being blown by wind. Wind erodibility is expressed as a soil grouping index of 1 to 8. The group number is based on sand, silt, and clay content and the susceptibility of soils to being blown by wind. Sandier soils have the highest wind erodibility potential and are assigned to Group 1. Soils with the lowest wind erodibility are assigned to Group 8.

Shrub. A low woody plant.

Silt (Geology). A rock fragment or detrital particle smaller than very fine sand and larger then coarse clay, ranging from 0.0024 to 0.00016 inche in diameter and commonly having a high content of clay minerals.

Silt (Soil). Individual mineral particles ranging in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class: Soil that is 80 percent or more silt and less than 12 percent clay.

Site Preparation. Any action taken in conjunction with a reforest effort (natural or artificial) to create an environment that is favorable for survival of suitable vegetation during the first growing season. This environment can be created by altering ground cover, soil, or microsite conditions through using biological, mechanical, or manual clearing, prescribed burns, herbicides, or a combination of methods.

Siting. The collection of exploration, testing, evaluation, and decision-making activities associated with the process of site screening, site nomination, site recommendation, and site approval for characterization or repository development.

Slate. A compact, fine-grained, platy metamorphic rock formed from shale or claystone.

Slip Surfaces. Slip refers to a planar feature where movement along a geologic fault has occurred and resulted in the displacement of formerly adjacent points on either side of the fault.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. For example, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Sodic (alkali) Soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Soil. The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

Solitude. The state of being alone or remote from habitations; a lonely, unfrequented, or secluded place. The intent is to evaluate the opportunity for solitude in comparison to habitations of people.

Special Recreation Management Area. An area where recreation is one of the principal management objectives, where intensive recreation management is needed, and where more than minimal recreation-related investments are required.

Special Recreation Permit. Authorizations, which allow for recreational uses of the public lands and related waters. They are issued as a means to control visitor use, protect recreational and natural resources, provide for the health and safety of visitors, and as a mechanism to accommodate commercial recreational use of public lands.

Special Status Species. Plant or animal species that are federally listed or proposed under the Endangered Species Act, or Bureau of Land Management or USFS sensitive species.

Special Stipulation. A specific operating condition or limitation added to a mineral lease to protect sensitive resources. It modifies the original terms and conditions of that lease.

Special Use Area. Units of land that federal or state agencies manage for the protection and enhancement of specific resource values. This land includes designated wilderness, wilderness study areas, areas of critical environmental concern, and other special management areas including national wildlife refuges and ranges and national parks.

Species. A taxon of the rank species; which is the basic unit, and lowest principal category, of biological classification; in the hierarchy of biological classification, the category below genus; a group of organisms formally recognized as distinct from other groups.

Species Composition. The different species found in a given area.

Species of Management Concern. For the purposes of this document, a designation for species identified by the Natural Resources Group committee which are a focus of management by the BLM or the states of Nevada and/or Utah. Non-game species are included because populations are declining, threats to the species need to be monitored, or the species are protected under regulations such as the Migratory Bird Treaty Act.

Specific Conductance. A measurement that indicates the capacity of a sample of water to transmit an electrical current, which is associated with the concentration of ionized substances in the water.

Spring. Flowing water originating from an underground source.

Springsnails. A group of freshwater mollusks that inhabit spring habitats. They also are referred to as pyrgs based on the genus, *Pyrgulopsis*.

Staging Area. An area where construction equipment and materials are assembled before use.

Standard. The goals to be strived for.

State (Transition State). A descriptor used to describe a recognizable, resistant, and resilient complex of soil and vegetation for an ecological site. The plant communities within a state are different from those of other states in the state-and-transition model. When a vegetation community loses resilience and characteristic ecological processes, it crosses a threshold into another state. Such transitions are not readily reversible like the shift among phases within a state.

Stipulation. A restriction that is insisted upon as a condition for an agreement.

Stream Channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Structure (Soil). The arrangement of primary soil particles into compound particles or aggregates.

Study Area. The physical extent of a resource as related to the area of the proposed project.

Subsidence. The movement or sinking of the land surface; often associated with removal of a liquid substance such as water or hydrocarbons from beneath the ground surface.

Subsidence Induced Damage. Damage caused by the movement or shrinking of the land surface.

Subspecies. A taxonomic rank below that of species, usually recognizing individuals that have certain heritable characteristics distinct from other subspecies of a species.

Surface Characteristics. The amount of bare ground, litter, rock, and basal cover of live vegetation, which may include cryptograms.

Surface Disturbing Activities, Surface Disturbance. Ground disturbance means any work or activity that results in a physical change to the ground surface, including excavating, digging, trenching, and plowing.

Surface Occupancy. See definition for No Surface Occupancy.

Survey (Soil). A field investigation resulting in a map showing the geographic distribution of various kinds of soil and an accompanying report that describes the soil types and interprets the findings.

Survey Protocol. The accepted standard methods, timing, equipment, and procedures for sampling species and habitats.

Sustainability. The ability to maintain diversity, productivity, resilience to stress, health, renewability, and yields of desired values, resource uses, products, or services over time in an ecosystem while maintaining its integrity.

Tackifier. A substance applied to soil surfaces to bind the soil surface and reduce wind dispersion of the soil.

Taxonomy, Taxonomic. The classification of organisms into groups based on similarities of structure or origin.

Taxonomic Composition. The relative abundance of a group of species that comprise a biological community (e.g., fish, invertebrates).

Terminus. The end point: a place where something ends or is complete.

Terrace (Geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Terrestrial. Relating to land; a land animal.

Terrestrial Invertebrates. Animals without backbones which live on land.

Texture (Soil). The relative proportions of sand, silt, and clay particles in a mass of soil.

Threatened Species. Any plant or animal species defined under the Endangered Species Act as likely to become endangered within the foreseeable future throughout all or a significant portion of its range; listings are published in the Federal Register.

Topography. The form and structure of the surface of land.

Total Dissolved Solids. Total amount of dissolved material, organic or inorganic, contained in a sample of water.

Traditional Cultural Property. A property that derives significance from traditional values associated with it by a social and/or cultural group such as an Indian tribe or local community. A traditional cultural property may qualify for the National Register if it meets the criteria and criteria exceptions at 36 Code of Federal Regulations 60.4 (BLM Manual 8100).

Traditional Use. This category is to be applied to any cultural resource known to be perceived by a specified social and/or cultural group as important in maintaining the cultural identity, heritage, or well-being of the group. Cultural properties assigned to this category are to be maintained in ways that recognize the importance ascribed to them and seek to accommodate their continuing traditional use.

Trail. A pathway usually created and maintained by human foot traffic, beasts-of-burden, livestock, or wildlife.

Transect. To divide by cutting across.

Transient. Passing or short-term.

Transition. The trajectory of system change between states that lead to the establishment of a new state.

Transition State. See state.

Trend. The direction of change over time, either toward or away from desired management objectives.

Upland (Geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Upland. Terrestrial ecosystems located away from riparian zones, wetlands, springs, seeps and dry washes; ecosystems made up of vegetation not in contact with groundwater or other permanent water sources.

Upland Game Birds. Non-waterfowl game birds, such as grouse, pheasant, quail and wild turkey.

Vigor. Healthy growth; the ability to survive and grow.

Visual Resource Management Classes. A classification of landscapes according to the kinds of structures and changes that are acceptable to meet established visual goals (Bureau of Land Management).

Visual Resources. The visible physical features of a landscape (topography, water, vegetation, animals, structures, and other features) that constitute the scenery of an area.

Watershed. 1) A total area of land above a given point on a waterway that contributes runoff water to the flow at that point. 2) A major subdivision of a drainage basin.

Way. A trace maintained solely by the passage of vehicles which has not been improved and/or maintained by mechanical means to ensure relatively regular and continuous use.

Weed. A plant considered undesirable, unattractive, or troublesome, usually introduced and growing without intentional cultivation.

Wetlands. Areas characterized by soils that are usually saturated or ponded, i.e., hydric soils, that support mostly water-loving plants (hydrophytic plants).

Wild Horses. Unbranded and unclaimed horses that use public land as all or part of their habitat, or that have been removed from such land by an Authorized Officer but have not lost their status under Section 3 of the "Wild Free-Roaming Horse and Burro Act."

Wilderness Study Area. A roadless area or island that has been inventoried and found to have wilderness characteristics as described in section 603 of the Federal Land Policy and Management Act of 1976 and section 2 (c) of "The Wilderness Act." Wilderness Study Areas were administratively designated by Bureau of Land Management following evaluation of wilderness inventories.

Wilderness. An area designated by Congress and defined in Section 2(c) of the Wilderness Act of 1964 as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined as an area of undeveloped federal land retaining it primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which: 1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; 2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; 3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and 4) also may contain ecological, geological, or other features of scientific, educational, scenic, or historical values.

Wildland Fire. Any nonstructure fire, other than prescribed fire, that occurs in the wildland.

Wildlife Action Plan. A comprehensive state wildlife agency document which addresses eight parameters for wildlife species: the current distribution and abundance, location and condition of habitats critical to species' survival, problems that may harm the species and habitat, priority research needed to adequately address conservation actions, prescriptions and goals for conserving wildlife species and critical habitats, monitoring of wildlife populations and habitats and success of prescribed conservation actions, assessment of Plan at intervals not to exceed ten years, involvement of federal, state, local agencies and Indian tribes that manage lands or programs affecting the wildlife, and incorporation of public participation.

Winter Hibernaculum. A protective case, covering, or structure, such as a plant bud, tree bark, or burrow in which an organism remains dormant for the winter; the shelter of a hibernating animal.

Woodland. A forest community occupied primarily by noncommercial species such as juniper, mountain mahogany, or aspen.

Xeric. An environment or habitat that is extremely dry, lacking humidity and water.

Zone of Saturation. The area in an aquifer, below the water table, in which relatively all pores and fractures are saturated with water. The phreatic zone may fluctuate with changes of season and during wet and dry periods. Multiple zones of saturation may occur below any given point on the surface.

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